

# Dyadic Interventions and Attachment Style in Populations Coping with Chronic Pain



THE UNIVERSITY  
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This thesis is dedicated to my parents and sister; you have consistently championed me through everything. Your support and encouragement has meant more than you can know. Thank you.

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**Background:** Chronic Pain is increasingly conceptualised as a phenomenon dictated by social context and close relationships, with some interventions electing to include a significant other in the treatment process. Moreover, research regarding attachment style and chronic pain is limited, particularly in regards to how the attachment style of significant others influences the patient's pain experience.

**Aims:** This thesis had two aims; to systematically review the literature investigating dyadic interventions in chronic pain populations (Chapter 1), and to use Conditional Process Analysis and Hierarchical Regression to explore how attachment style influences established aspects of pain experience (Chapter 2).

**Method:** Controlled studies exploring the efficacy of dyadic psychosocial interventions targeting distress were reviewed systematically. The empirical study employed Conditional Process Analysis and Hierarchical Regression to investigate the predictive capacity of both patients and partner attachment in predicting Depression, Self-Efficacy, Pain Disability and Psychological Flexibility.

**Results:** Findings of the systematic review indicate that dyadic interventions are effective in reducing distress, but due to the limited quality of evidence, it is not yet possible to determine whether they are superior to patient-only interventions. The results of the empirical study suggest that attachment avoidance in patients has unique predictive capacity in depression and self-efficacy outcomes. Partner attachment avoidance was found to influence levels of the patient's psychological flexibility.

Findings from the empirical study suggest that avoidant attachment may amplify the relationship between pain intensity, pain catastrophizing and psychological distress; assessing the attachment style of patients may help to tailor psychological intervention to patient need. Avoidant partners may influence patient levels of psychological flexibility, and therefore interpersonal attachment could be a future consideration in Acceptance and Commitment Therapy Trials.

## **Chapter 1: Systematic Review**

### **Dyadic Interventions for Populations Coping with Chronic Pain Conditions**

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## **Abstract**

**Background:** Dyadic Interventions (the inclusion of a significant other) in the treatment of chronic pain is a method of addressing the interpersonal aspects of the pain experience. Previous reviews have investigated psychological interventions for patient-partner dyads, although none have yet synthesised the overall dyadic evidence base (including patient-parent dyads) of randomised and controlled trials for chronic pain.

**Method:** A systematic search strategy was used and eleven studies met the inclusion criteria. Traditional and adapted forms of Cognitive Behavioural Therapy (CBT), Operant Behavioural Treatment (OBT), Couples Systems Therapy and Motivational Interviewing (MI) were reviewed.

**Results:** Overall, within participant treatment effects indicate dyadic interventions are effective in reducing psychological distress. Of note, online CBT programme for patient-parent dyads (Web-MAP) was found to be helpful in reducing psychological distress, with a single session MI intervention effective in patient-partner dyads. The evidence as to whether dyadic interventions are superior to traditional interventions was less conclusive.

**Conclusion:** The review was limited due the heterogeneity of the population samples; the broad assessment tools for distress may also have obscured some of the additional benefits of dyadic interventions. The evidence overall supports the efficacy of dyadic approaches, but more research is needed to clarify whether the results from the highest quality studies in the review (Web-MAP in adolescents and MI in adults) can extend to the wider CP population, outside their ordained demographic.



## Introduction

### **i. Chronic Pain through the Dyadic Lense**

‘Chronic Pain’ (CP) is a complex and burdensome condition, defined as pain lasting longer than three months, or beyond normal tissue healing time (Treede, 2018). With a CP population of around 28 million in the United Kingdom (Fayaz, Croft, Langford, Donaldson, & Jones, 2016), unmanaged CP has evidenced long-term psychological and physiological consequences, including depression, disability, reduced independence and lower quality of life (Coker et al., 2010). Evidence-based psychological interventions have successfully reduced pain-induced distress, typically with an emphasis on addressing threat appraisal, forming positive coping strategies and improving quality of life (Sturgeon, 2014).

One of the most widely used CP treatment packages, the Pain Management Programme (PMP) is multi-disciplinary, with Europe and USA-based programmes typically offering a balance of medication, physical rehabilitation, and psychological elements (Hughes, 2000). The psychological treatment models within PMPs have largely been grounded in cognitive-behavioural therapy (CBT), and up to this point in the literature, predominantly target the patient.

A growing area of research argues patient-only CP interventions fail to consider that the issues influencing distress (e.g. interpersonal issues, lack of medication adherence, exercises and cognitive strategies) may also be influenced by unexamined factors in significant others and caregivers: a partnered, interactive ‘dyad’ (Romeo, Tesio, Castelnovo, & Castelli, 2017). In CP populations, significant others are often responsible for emotional support, physical assistance and may also financially and socially assist. In some cases, these

individuals (such as parents, spouses/partners, family members and close friends) provide unpaid care at home, involving significant time and energy.

There is widespread consensus that significant others play a critical role in the pain experience (McCracken, 2005; Mikail, Henderson, & Tasca, 1994; Romeo et al., 2017) . Consequently, the non-patient within the ‘dyad’ may experience psychological distress themselves, and can lack basic knowledge about their partner’s CP condition (Turner et al., 2017). Dyadic interventions offer the opportunity to include significant others in treatment, and have potential in CP populations due to their ability to address both individual and interpersonal factors influencing effective pain management, caregiving, and rehabilitation.

This review describes the available evidence for dyadic interventions targeting CP patients and significant others, and will examine their effectiveness in reducing psychological distress. It samples research with robust study designs and examines the outcomes of CP patients of all ages, throughout the life span. This review will suggest opportunities and new directions for this growing area of research, as well as implications for psychological practitioners.

## **ii. Dyadic Interventions in Practice**

Through his work examining the influence of solicitous and punishing responses of partners on patient pain behaviours, McCracken (2005) ushered in a new wave of empirical studies examining the interactive and social ‘dyadic’ processes of CP. Trials and evaluations of dyadic psychological interventions, however, have largely been restricted to cancer and dementia populations (Whitlatch, Judge, Zarit, & Femia, 2006).

Many dyadic interventions in clinical health psychology settings do not specify theoretical orientation. However Badr, Bakhshaie, and Chhabria (2019) assert there are three frameworks for dyadic treatment. The first highlights patient stress and coping theories, and conceptualises social support as assistance which in turn, influences how people appraise pain symptoms. The second, ‘resource theory’, views the significant other as a resource the CP patient can draw upon for assistance during difficult life events. The third, ‘Dyadic’ models, focuses on joint problem-solving, the coordination of daily tasks and everyday demands, and approaching CP as a cohesive unit.

Across the literature base, significant others have been involved in dyadic interventions in two distinct ways (Badr et al., 2019). The first method positions the significant other as an assistant or “coach” to facilitate patient learning and pain coping skills. This approach, sometimes described as “partner-assisted” (Mellor et al., 2019), positions the significant other in a purely supportive role within the intervention. The second approach aims to actively involve a significant other in therapy by focusing on the functionality of the dyad unit, whilst addressing the needs and concerns of both participants.

Dyadic interventions for CP are typically comprised of psychoeducational and skills training components (namely, information about chronic pain, self-management skills, distress management techniques, and/or relationship-enhancement skills). Therapeutic strategies that have been used include pain education, interpersonal and marital counselling, cognitive behaviour therapy, and emotion-focused therapy (Badr et al., 2019). Interventions have been predominantly delivered by psychologists, nurses or other health professionals.

### **iii. Intervention Overview**

The following section provides a brief summary of the dyadic interventions considered for inclusion in this review;

#### **a. Cognitive Behavioural Therapy (CBT) Interventions**

Cognitive-behavioural therapy (CBT) is a form of psychotherapy commonly used with patients with chronic pain. Previous studies have shown that, where administered alone or in combination with medical treatment, CBT improves pain and associated problems, such as anxiety and depression (Beasley, 2013; Gorin, 2001). CBT for CP is generally perceived as the gold-standard psychological treatment (Sturgeon, 2014) with numerous large randomised controlled trials demonstrating its effectiveness (Williams, Eccleston, & Morley, 2012)).

CBT's central premise is that pain is affected by individual cognitions (not just tissue injury) and that maladaptive cognitions contribute to the maintenance of emotional distress and behavioural problems. CBT focuses on reducing pain and distress by modifying physical sensations, catastrophic thinking, and maladaptive coping behaviours. Dyadic CBT typically emphasises an interpersonal understanding of pain-related cognitions, and how behaviour differs depending on threat appraisals (Fischer, 2016; Wirick, 2018) and this has been employed across the lifespan. Dyadic CBT is also delivered in a variety of formats with large-scale trials favouring web-based programmes (Palermo, Law, Fales, et al., 2016; Palermo, Wilson, Peters, Lewandowski, & Somhegyi, 2009) to increase accessibility.

#### **b. Operant Behavioural Treatment (OBT)**

Founded on the operant pain model (Fordyce, 1976), OBT assumes that pain, even though originally a reflex and warning system, is maintained through reinforcement (McCracken,

2005). OBT posits that pain behaviours are learned (controlled by operant conditioning) through rewards and punishments for specific pain behaviour.

Treatment strategies include contingent positive reinforcement of pain-incompatible behaviour and reduced or absent positive reinforcement of pain behaviours. Typically, monitoring physical activity to enhance motor perception is a key feature, as well as training in assertive pain-incompatible behaviours (Hudgens, 1979; Kole-Snijders et al., 1999). Notably, active participation of spouses has traditionally been encouraged across OBT studies, as the spouse can learn to reinforce the patient's pain-incompatible behaviours, and reduce reinforcement for maladaptive pain behaviours. OBT studies have generally been underpowered, with most comprised of pre-and-post treatment design, without control groups.

#### **c. Couple Systems Therapy (ST) also known as Family Therapy**

Developed by Murray Bowen in the 1960's, ST argues that individuals are inseparable from their network of relationships. For CP populations, Bowen and proponents of ST contend that the CP cannot be fully understood in isolation because the family is an interconnected emotional unit (Lewandowski, Morris, Draucker, & Risko, 2007). In CP populations, studies have typically adhered to a case series design rather than more robust controlled trials, making the findings challenging to generalise (Hudgens, 1979).

#### **d. Motivational interviewing (MI)**

MI refers to a directive, client-centred counselling style for eliciting behaviour change (Miller, Cano, & Wurm, 2013). MI supports patients to explore and resolve ambivalence, and addresses concerns specific to their current situation. MI asks the patients to articulate "pros"

and “cons” of their current coping strategies, and to address the discrepancy between the patient's current behaviour and important goals in his or her life, by increasing motivation and intention to alter behaviour.

In populations with chronic conditions, MI strategies include eliciting self-motivational statements, listening with empathy, asking open-ended questions, presenting personal feedback, affirming the patient and handling resistance. MI studies for CP have generally sampled smaller numbers of participants, often utilising exercise programmes as control groups (Aguerre, Bridou, Laroche, Csillik, & Jensen, 2015; Friedrich, Gittler, Arendasy, & Friedrich, 2005). The evidence suggests that adjunctive MI can optimise pain outcomes and specifically, pain-related disability (Vong, Cheing, Chan, So, & Chan, 2011). MI has also been used extensively in dyadic formats within weight management programmes and other physical health interventions (Bianchi-Hayes et al., 2018)

### **Aim of the Review**

The aim of the review was to evaluate the evidence for dyadic interventions in improving psychological distress in people coping with chronic pain

## Methodology

### Search Strategy

The Cochrane Database of Abstracts of Reviews of Effects (DARE) was searched in July 2019 to establish whether a similar review examining dyadic interventions for populations with chronic pain had already been conducted. No such review was found, although three existing reviews in progress (focusing on only romantic couples, and thus not overlapping with the present review's focus) were registered on Prospero.

### Concurrent Paper in Couple-Based Interventions

After initial scoping reviews had commenced in early August 2019, Smith et al., (2019) (Smith et al., 2019) published a paper in November of 2019, examining the evidence for couple interventions for chronic pain populations. Smith's review focused solely on dyads in long-term romantic relationships, with the review's inclusion criteria encompassing pre-and-post treatment designs with no control groups. The present review's criteria had no restrictions on age or dyad type, nor did it include studies without control conditions.

In January 2020, a multi-database search was conducted. The following terms were mapped onto subject headings and relevant terms exploded:

*(chronic pain\*.mp. OR chronic pain.) ti, ab OR (persistent pain) .mp*

AND

*intervention\*.mp. OR therap\*.mp. OR counsel\*ing.mp. or counseling/ OR psychotherapy/  
OR exp marital therapy/ OR exp couple therapy/  
OR exp family therapy/*

AND

*dyad\*.mp. OR couple therapy/ OR couple\*.mp. OR partner\*.mp. or domestic partner/  
OR spouse/ or spouse\*.mp. OR wife/ OR wives.mp. OR husband/ OR parent/ OR caregiver/  
or caregiv\*.mp. OR family/ or famil\*.mp.*

The following electronic databases were searched:

EBSCO PsychInfo (1806 to January Week 3, 2020)

Ovid MEDLINE (R) (1946 to January Week 3, 2020)

Ovid Embase (1980 to 2020 Week 3)

The Cochrane Central Register of Controlled Trials (CENTRAL)

Titles and abstracts of papers were screened and reviewed in accordance with the inclusion and exclusion criteria. The reference sections of included studies were checked. Through the online academic platform ResearchGate, authors were contacted to ascertain the existence of other studies in progress or unpublished in the area. In addition to this search method, a manual search was undertaken to ensure no papers had been missed. The reference sections of included papers were examined, as well as publications citing these studies on Google Scholar.

### **Inclusion/Exclusion criteria**

For the current review, studies had to report on a dyadic (or ‘non-individualised’) intervention for individuals coping with chronic pain. ‘Dyadic’ refers to the inclusion of the patient and one significant other (family member, parent, partner, spouse or informal caregivers) in the active treatment. The review extracted data only from psychosocial interventions with a therapeutic focus, in contrast to purely psychoeducation or caregiver-



only support interventions. Non-patient participants were required to participate in at least 50% of the overall treatment. However, target variables were required to be patient-focused.

Family interventions with more than two members involved in active treatment were excluded, as were studies pertaining to the treatment of cancer-related pain, acute pain (course of pain lasting less than 12 weeks) or populations with a specified physical comorbid condition. Due to the limited number of controlled trials in this area, no age, gender or other demographic criteria were specified. To ensure a high level of quality, only peer-reviewed journal articles were included in the final sample. Reviews, book chapters, dissertations and conference papers were excluded, as were qualitative studies, case studies and studies not reporting on a dyadic intervention for individuals coping with chronic pain.

## **Outcome**

Validated measures were required for the core variable of interest: psychological distress, reported at baseline and at post-treatment. Active or non-active control conditions were required to be included to allow for comparison; studies without a control arm were not included. As translation services were unavailable, only studies published in the English language were included. A PRISMA flow chart of the process for study selection is outlined in Figure 1.

## **Assessment of Quality**

Case studies were omitted due to adequate numbers of studies meeting higher quality standards; all selected articles were randomised controlled trials (RCT) or controlled trials. Quality criteria aligning with the focus of this review were extracted from various sources. Subsequently a checklist was developed, utilising the methodology guidelines from both the

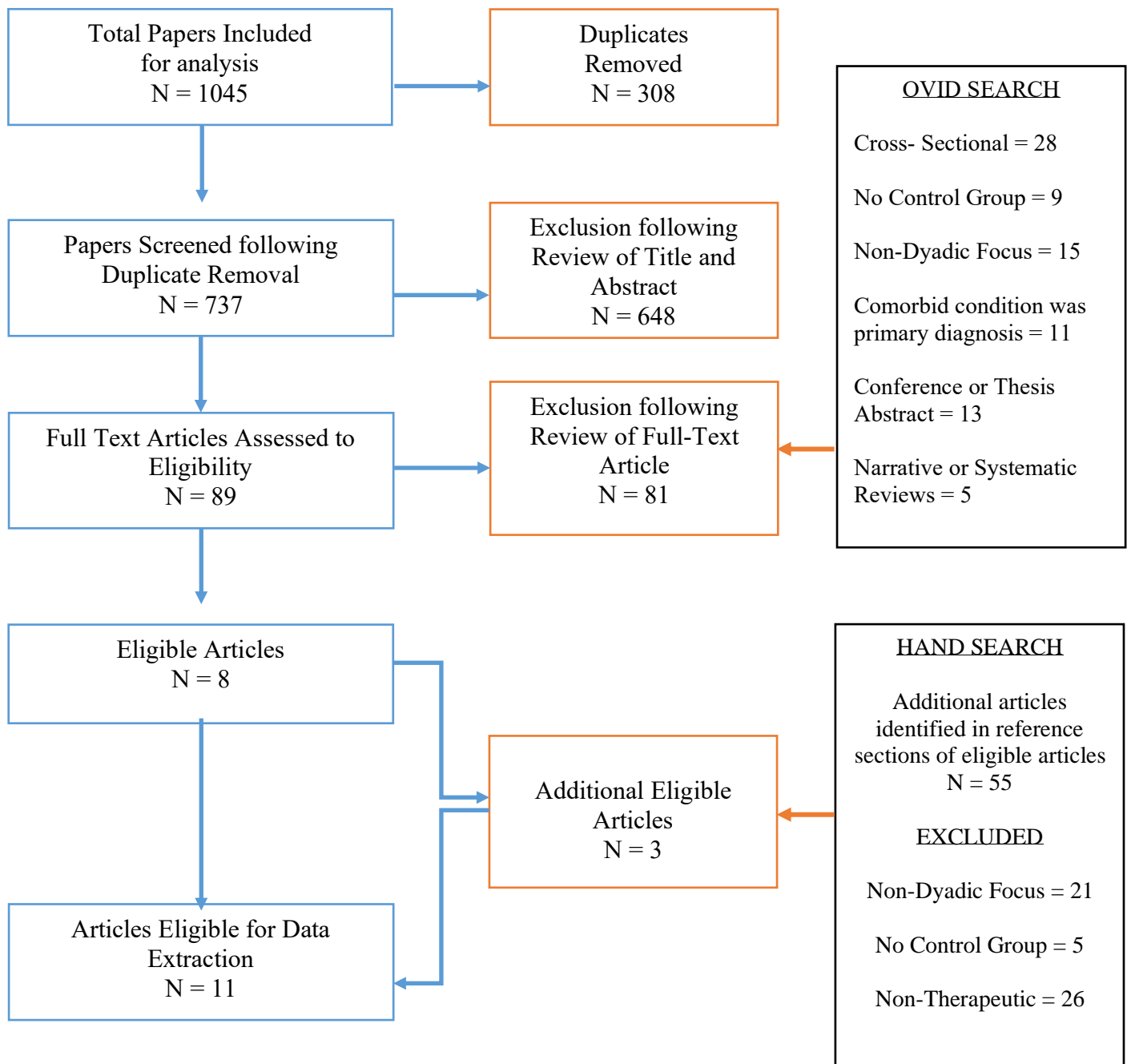
Consolidated Standards of Reporting Trials (CONSORT) and the Scottish Intercollegiate Guidelines Network (SIGN) as well as criteria outlined by Sinclair and Gillanders (2013). The final quality assessment checklist comprised of 16 items relating to study design, methodology, matching of control group, intervention, results and limitations.

Each of the 16 aspects were rated, with four possible outcomes: (3) well covered, (2) adequately addressed, (1) poorly addressed and (0) not addressed. A total quality score and percentage was calculated, out of a possible 48 points, with each criterion given equal weight and total scores converted into percentages. O'Connor et al. (2015) assert that quantitative scores in isolation are imprecise and subject to bias, so quantitative scores were assigned three qualitative descriptors: low quality (<50%), adequate quality (50%-75%) or high quality (>75%). Appendix B details the quality assessment checklist.

### **Data Extraction**

Studies meeting the inclusion criteria are summarised in Table 1, information is presented pertaining to study design, participants, intervention, outcome measures, main findings and limitations. This data was extracted, with studies rated by the First Author. To ensure the reliability of ratings, the 11 studies were also rated by another doctoral student in Clinical Psychology, who was in their final year of graduate school (NC). Agreement was 90% with divergence resolved through discussion. A summary of completed ratings is provided in Table 2.

**FIGURE 1**  
**PRISMA DIAGRAM**



## RESULTS

### Study Inclusion

In the final search, 1045 studies were identified. Following removal of duplicates, 737 papers remained, with eleven studies ultimately meeting the inclusion criteria. Seven studies analysed the impact of dyadic interventions for patients and romantic partners, with four sampling patient-parent dyads.

Five studies evaluated CBT interventions; three of which used the Internet-based Web-MAP programme (Law, Beals-Erickson, Noel, Claar, & Palermo, 2015; Palermo, Law, Fales, et al., 2016; Palermo et al., 2009), with two evaluating a group CBT programme (Abbasi et al., 2012; Moore & Chaney, 1985). A further study trialled a telephone-based CBT intervention for couples (Ramke, Sharpe, & Newton-John, 2016), and another trialled a CBT intervention in-person with an adolescent-parent sample (Levy et al., 2010).

Two studies focused on operant behavioural therapies, with a focus on partner reinforcement of pain behaviours adjunctive to typical treatment. One paper evaluated the efficacy of a couple-based tailored assessment using motivational interviewing (Miller et al., 2013) and another reviewed the effectiveness of Couple Systems Therapy (Saarijarvi, 1991). Table A.1 provides a summary of the findings.

### Study Design

All included studies were randomized controlled trials or controlled trials, which included patient assessment at both pre-and post-treatment and at follow-up points.

Four studies utilised a wait-list control group (Kole-Snidjers et al., 1999; Moore et al., 1985; Turner, 1990; Palermo et al., 2009). Three studies used pain education groups as controls to compare with active treatment (Levy et al., 2010) (Levy et al., 2010; Miller et al., 2013;

Palermo, Law, Fales, et al., 2016), with three studies utilising standard patient-only interventions (Abbasi et al., 2012; Law et al., 2015; Moore & Chaney, 1985; Ramke et al., 2016; Saarijarvi, 1991).

### **Power Calculation**

Nine studies reported power calculations, of which 4 were adequately powered.

(Palermo et al., 2009; Palermo et al., 2016; Law, 2015; Levy, 2010).

The remaining studies were likely to be underpowered based on small sample sizes. Seven studies reported effect sizes (Abbasi et al., 2011; Ramke et al., 2016; Miller et al., 2013; Turner et al., 1990; Palermo et al., 2009; Law et al., 2015 and Palermo et al., 2016).

### **Quality Ratings**

Agreement between first and second rater was 91%. Both ranked the Web-MAP intervention by Palermo et al., (2016) as the study which best adhered to the quality criteria (91%), followed by Law et al. (2015) with a score of 89% and Levy et al. (2010) with 88%. Overall ratings of quality were based on percentages, which corresponded to scores out of a maximum total of 48 (16 items, with a maximum score of 3 for each).

The common feature of the three highest quality studies was the sampling of parent-adolescent dyads, not romantic couples. All three papers included large-scale trials with very well-matched control groups, and included parent (non-patient) responses which allowed treatment efficacy to be measured from two perspectives: through an authentically dyadic lens. For patient-partner dyads, single session Motivational Interviewing (Miller et al., 2013) acquired the highest quality rating.

**Table 1: Summary of Included Studies**

PATIENT - ROMANTIC PARTNER DYADS						
First Author	Design	Participants	Intervention Description and Control	Psychosocial Outcomes & Main Findings relevant to Present Review	Baseline to Follow Up Effect Sizes for Distress	Limitations
Abbasi (2011) Iran	RCT  CST - CBT	Couple Dyads  Patients ( $n = 36$ )  Chronic Low Back Pain Population	<b>Intervention:</b> Spouse Assisted Training in Pain Coping Skills (CST) in Pain Management Programme (SA-MPMP; $n = 12$ ). Spouses set goals alongside patients and participated in pain psychoeducation. Programme was conducted by a clinical psychologist, and delivered in seven, weekly, 2-hour sessions.  <b>Control:</b> Individual CST in PMP ( $n = 12$ ) Standard Medical Care ( $n = 12$ ). (+12 month follow-up)	<b>Outcome Measures:</b> Depression Anxiety Stress Scale (DASS) Tampa Scale for Kinesiophobia (TSK) Pain Catastrophizing Scale (PCS) Pain Severity (VAS)  <b>Main Findings:</b> Patients receiving SA-MPMP had significant reductions in kinesiophobia [ $F(2, 22) = 7.10$ ; $p = 0.003$ ] and rumination [ $F(2, 28) = 6.13$ , $p = 0.006$ ] compared to both control groups during post treatment and at follow up,	Between Group Anxiety (TSK) $d = 0.33$  PCS (rumination) $d = 0.30$	Small sample size  Pain duration of patients long, which possibly impaired treatment efficacy  Gender distribution not equal  SMC (control) care not standardized  No spousal outcomes reported
Ramke (2016) Australia	RCT	Couple Dyads  Patients	<b>Intervention:</b> Adjunctive Couples Intervention (ACI) to CBT PMP for Chronic Pain ( $n = 19$ ). ACI spouses and	<b>Outcome Measure:</b> DASS Dyadic Adjustment Scale (DyAS; marital satisfaction)	Between Group	Small and homogenous  Caucasian sample. Marital satisfaction

	ACI - CBT	( <i>n</i> = 45)  Mixed chronic pain conditions	partners had additional four 1-hour telephone- based consultations with a qualified Psychologist, focusing on pain education, patient–partner, communication, operant behavioural principles and relapse prevention strategies.  <b>Control:</b> Standard CBT for Chronic Pain- Patient Only (PPO) ( <i>n</i> = 26) (+ 1 month follow-up)	<b>Main Findings:</b> ACI demonstrated significant improvement in marital satisfaction for ACI spouses compared to PPO alone ( <i>p</i> = 0.003).  Significant improvements in pain management outcomes for ACI patients compared to PPO; marital satisfaction ( <i>p</i> = 0.83), stress ( <i>p</i> = 0.59), anxiety ( <i>p</i> = 0.31) or depression ( <i>p</i> = 0.08)	DASS (depression) $\eta^2$ = 0.011  DASS (anxiety) $\eta^2$ = 0.012  DASS (stress) $\eta^2$ = 0.009	baseline high in overall sample. Thus, potential selection bias from staff.  Speakerphone not utilised for spouse consultation so patient could not also participate in this aspect.
Kole - Snidjers (1999) Netherlands	RCT  OBT	Couple Dyads  Patients ( <i>n</i> = 148)  Chronic Low Back Pain Population	<b>Intervention:</b> Operant Behavioural Treatment (with spouse pain education and behavioural reinforcement) and Cognitive Coping Skills training (OPCO, included 7 weeks of spouse training, <i>n</i> = 58)  <b>Control:</b> 1) Wait- list control ( <i>n</i> = 30), 2) Operant Behavioural Treatment with Group Discussion (OPDI, <i>n</i> = 58)	<b>Outcome Measures:</b> Visual Analogue Scale (Pain Intensity) Pain Cognition List Beck's Depression Inventory (BDI) The Nijmegen Hyperventilation Questionnaire  <b>Main Findings:</b> conditions with spousal involvement resulted in less negative affect compared to controls.	Not reported	Patient compliance with cognitive skills training was markedly poor (homework relaxation exercise completion 14%). Acceptability likely an issue but not explored.  Attention Control Group (OPUS) likely active and subject to contamination bias

			<p>3) Operant Behavioural Protocol with no spouse involvement (OP, <math>n = 26</math>)</p> <p>(+ 6 and 12 month follow up)</p>	<p>OPCO and OPDI groups demonstrated significantly more improved patients than across negative affect and coping control compared to WLC <math>\chi^2(2, N = 149) &gt; 17.4, P &lt; 0.001</math>. No significant difference between OPCO and OPDI. Power considered 'reasonable' = .73 -.98</p>		<p>27% overall attrition rate at follow up</p> <p>Wait list control.</p>
<p>Miller (2013) United States</p>	<p>Controlled Trial</p> <p>MI</p>	<p>Couple Dyads</p> <p>Patients (<math>n = 47</math>)</p> <p>Mixed chronic pain conditions</p>	<p><b>Intervention:</b> Couples Motivational Assessment (MI): a tailored assessment of their marriage and pain coping that incorporated motivational interviewing strategies (<math>n = 24</math>)</p> <p><b>Control:</b> Education regarding the gate control theory of pain (<math>n = 23</math>)</p> <p>(+ 1 month follow-up)</p>	<p><b>Outcome Measures:</b> Brief Pain Inventory (pain intensity) Dyadic Adjustment Scale (DyAS) Emotional Affect Scale (Cohen)</p> <p><b>Main Findings:</b> Couples in motivational assessment group experienced significant decreases in pain severity and negative affect (<math>b = -3/26, SE = .85, T = .383, p &lt; .001</math>), and increases in marital satisfaction and positive mood from baseline to post</p>	<p>Within group</p> <p>EAS (positive affect) <math>d = .68</math></p> <p>(negative affect) <math>d = .68</math></p>	<p>Treatment group had significantly more contact with interviewer than the control group <math>t(45) = 11.81, p &lt; .0001</math></p> <p>5 out of 6 dropouts were in motivational assessment group – reason why not clarified</p> <p>No MI adherence measure for facilitator</p> <p>No long-term follow-up</p>



				assessment, relative to the education control group.  Results maintained at 1-month follow- up.		
Moore (1985) United States	Controlled Trial  CBT	Couple Dyads  Patients ( $n = 43$ )  Mixed chronic pain conditions	<b>Intervention:</b> 16-hour Group CBT Programme with Spousal Involvement ( $n = 17$ ) Patients and spouses attended eight twice-weekly 2-hr therapy sessions. Session presented in an informal lecture discussion format.  <b>Control:</b> Individual patients at Group CBT Programme ( $n = 14$ ), Waitlist Control ( $n = 12$ )  + 3 -7 month follow ups	<b>Outcome Measures:</b> Minnesota Multiphasic Personality Inventory (Hysteria, Hypochondriasis and Depression) The Locke Marital Adjustment Test  <b>Main Findings:</b> Depression was not affected by treatment group compared to control. Spouse involvement did not facilitate response to treatment on any variables.  All treatment gains were maintained at 3-month and 7-month follow-ups. Spouse involvement not essential for a positive response to treatment.	Not reported	Waitlist Control  Homework and Compliance not monitored  Significant gender imbalance in sample (all exception 1 patient were males).  Underpowered
Saarjavi (1991) Finland	Controlled Trial	Couple Dyads	<b>Intervention:</b> Couple Systems Therapy (CT). Five monthly sessions conducted	<b>Outcome Measures:</b> The Marital Questionnaire Brief Symptom Inventory	Not reported	Small Sample

	CT	<p>Patients (<math>n = 63</math>)</p> <p>Chronic Low Back Pain Population</p>	<p>by two therapists. CP outpatients with partners, with a focus on active questioning, relational structure, hierarchical organization and boundary characteristics.</p> <p>Each session lasted 1-2 hours. (<math>n = 33</math>)</p> <p><b>Control:</b> Treatment as usual without CT in Primary Care (<math>n = 30</math>)</p> <p>+ 12 month follow up</p> <p>+ 5 year follow up</p>	<p>The Attitude Scale</p> <p><b>Main Findings:</b> 1 year follow up - difference in marital satisfaction between the groups (<math>p = 0.02</math>, MANOVA) in favour of CT.</p> <p>Significant difference in psychological distress showed differences between male groups in somatization (<math>p = 0.02</math>), depression (<math>p = 0.05</math>), anxiety (<math>p = 0.02</math>) found at 1 year follow up</p> <p>At 5 year follow up – decrease in psychological distress for treatment group (<math>p = 0.005</math>, MANOVA), but no differences in pain intensity, health locus of control beliefs.</p>		<p>Control Group poorly specified, power/effect size not reported</p> <p>Initially higher distress scores in treatment group rather than in the control group (<math>p = 0.04</math>), especially in men (<math>p = 0.01</math>)</p> <p>No reporting of therapist fidelity or patient engagement monitoring through homework</p> <p>No monitoring of medication strategies utilised alongside CT, potential uncontaminated treatment effects.</p>
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Turner (1990) United States	Controlled Trial  OBT	Couple Dyads  Patients (n = 96)  Chronic Low Back Pain Population	<b>Intervention:</b> Group behavioural intervention for couples. Spouses attended 5 of 8 sessions, presented info on behaviour reinforcement; received training promoting direct communication Treatment Group included aerobic exercise (BE). (n = 24) 2. Behavioural Therapy Only (B) (n = 25) 3. Aerobic Exercise Only (E) (n = 24) <b>Control:</b> Waitlist control (n = 23) + 6 and 12 month follow ups	<b>Outcome Measures:</b> Sickness Impact Profile (by both patients and spouses) Centre for Epidemiologic Studies Depression Scale (CES-D)  <b>Main Findings:</b> At both follow-ups, all 3 treatment groups significantly improved from pre-treatment $F(5.34) = 8.48, p < 0.001$ .  No sig. difference between the groups, and thus no statistical benefit of spousal involvement.	Between Group  CES-D (d = not reported)  Sickness impact Profile for 12-month follow-up (d = 0.5)	No detail provided on randomisation process.  Underpowered. Effect sizes ranged from .14 to .28 at 6 month follow up and .04 to .32 at 12 month follow up.  Total of $n = 215$ needed to detect statistically significant differences between groups. Concerns re SIP ability to detect clinically significant improvement
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PATIENT- PARENT DYADS						
First Author	Design	Participants	Intervention and Control	Outcomes relevant to Review And Main Findings	Baseline to Follow Up Effect Sizes for Distress	Limitations
Palermo (2009) United States	RCT  CBT	Parent- Child Dyad  Patients ( $n = 48$ )  Mixed chronic pain conditions	<p><b>Intervention:</b> Internet delivered CBT intervention, Web-MAP, including relaxation and parent operant techniques. 8 weeks of online modules; 50:50 parent-child focus. (<math>n = 26</math>)</p> <p><b>Control:</b> Wait-List Control Group, continued with standard medical care (<math>n = 22</math>)</p> <p>(+3 month follow-up)</p>	<p><b>Outcome Measures:</b> Revised Child Anxiety and Depression Scale (RCADS)  Parental Protectiveness Scale NRS (11 pain point)</p> <p><b>Main Findings:</b> In treatment group, child's depressive symptoms were significantly lower at three-month follow-up than at post-treatment, Wilks' Lambda = .78, overall <math>F(2, 24) = 3.47, p = .05</math>,</p> <p>No significant differences from control in depressive symptoms post-treatment (control, <math>M = 62.6</math> and intervention <math>M = 58.96</math>).</p> <p>Significant reductions in pain intensity and activity limitation</p>	<p>Within Group</p> <p>RCADS (depressive symptoms) <math>\eta^2 = .07</math>.</p>	<p>Waitlist control, so no attention control. Difficult to disentangle treatment from placebo effects.</p> <p>.</p>

				for online intervention group compared to waitlist control.		
Law (2015) United States	RCT  CBT	Parent-Child Dyad  Patients ( $n = 83$ )  Chronic Headache Population	<p><b>Intervention:</b> Internet CBT adjunctive to specialized headache treatment, (Web-based Management of Adolescent Pain; Web-MAP) (<math>n = 44</math>)</p> <p>9-hour total treatment duration (4 hours for adolescents, 4 hours for parents, 1-hour online coach time).</p> <p><b>Control:</b> Specialized headache treatment alone (<math>n = 39</math>) comprised of various combinations of medication management psychological therapy OR physical therapy + 3 month follow up</p>	<p><b>Outcomes Measures:</b> Children's Manifest Anxiety Scale (RCMAS 2) Children's Depression Inventory (CDI)</p> <p><b>Main Findings:</b> Both groups reported a statistically significant decrease in depressive symptoms from baseline to post-treatment and baseline to follow-up (main effect for time <math>F(2, 98) = 5.91, p = .004</math>).</p> <p>No statistically significant between group differences in depression or anxiety at post-treatment or follow-up (<math>p &gt; 0.05</math> for all outcomes).</p>	<p>Within Group</p> <p>RCMAS (Anxiety) <math>d = .09</math></p> <p>Depression (CDI) <math>d = .46</math></p>	<p>Parent and Adolescent internet modules completed separately</p> <p>Standard medical care received by youth in both groups was variable</p>
Palermo (2016) United States	RCT  CBT	Parent-Adolescent Dyad  ( $n = 273$ )	<p><b>Intervention:</b> Internet-delivered CBT, multicentre trial (<math>n = 138</math>). 8 hours of online treatment modules; 50:50 parent-child,</p>	<p><b>Outcome Measures:</b> Bath Adolescent Pain Questionnaire (Parent Impact Questionnaire)</p>	<p>Between Group</p>	<p>Limited exclusion criteria, effectiveness trial than a pure efficacy trial.</p>

		<p>205 females, 68 males (aged 11 to 17)</p> <p>Mixed chronic pain condition</p>	<p>with 1-hour overall involvement with online coach Treatment exposure equivalent for both patient and parent.</p> <p><b>Control:</b> Internet-delivered Education (<math>n = 135</math>)</p> <p>Pre, post + 6 month follow up</p>	<p>Adult Responses to Children Symptoms (ARCS)</p> <p><b>Main Findings:</b> For adolescent patients- Small treatment effects from baselines to post treatment were found for depression in adolescents (<math>b = -0.59</math>, <math>p = 0.04</math>, <math>d = 0.09</math>) and pain related anxiety (<math>b = -1.33</math>, <math>p = 0.04</math>, <math>d = -0.13</math>) but was not maintained at follow up.</p> <p>For parents, significantly greater reduction in depressive symptoms from baseline to post treatment (<math>b = -1.44</math>, <math>p &lt; 0.96</math>)</p>	<p>For adolescents BAPQ (<math>d = -0.09</math>)</p> <p>For parents BAPQ -PIQ (<math>d = 0.27</math>)</p>	<p>Sample heterogeneity diminished ability to detect treatment effects.</p> <p>Did not collect data on the duration of chronic pain.</p>
Levy (2010) United States	RCT  CBT	<p>Parent Child or Adolescent Dyad</p> <p>(<math>n = 200</math>)</p> <p>with functional abdominal pain</p>	<p><b>Intervention:</b> Three-session social learning/CBT intervention targeting parents' responses to their children's pain complaints and responses (<math>n = 100</math>). Sessions included relaxation and cognitive restructuring, lasted approximately 75 min. 60% of the clinician time was spent with child and parent together.</p>	<p><b>Outcomes Measures:</b> Child Depression Inventory Multidimensional Anxiety Scale for Children</p> <p><b>Main Findings:</b> Parent-reported child depression improved more in the SLCBT group compared with the education control; statistically significant at the post treatment</p>	Data not shown	Baseline differences in parent-reported child current pain (treatment group reported higher baseline level)

		<p>Children aged 7–17 years</p> <p>Parents were primary caregivers</p>	<p>Intervention location was variable.</p> <p><b>Control:</b> Three session educational intervention, (<math>n = 100</math>)</p> <p>1 week, 3 months, and 6 months posttreatment follow up</p>	<p>(<math>p = 0.08</math>)</p> <p>However, child self-reported depression, nor anxiety did not differ as a function of time &amp; treatment condition (<math>p &gt; 0.05</math>)</p> <p>CBT parents reported greater decreases in solicitous responses to their child's symptoms compared with control (time x treatment interaction, <math>p &lt; 0.0001</math>)</p>		
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**Table.2 Quality Assessment of Included Studies**

<b>QUALITY CRITERIA</b>	<b>RAMKE (2016)</b>	<b>ABBASI (2016)</b>	<b>PALERMO (2009)</b>	<b>TURNER (1990)</b>	<b>MILLER (2013)</b>	<b>PALERMO (2016)</b>	<b>LAW (2015)</b>	<b>LEVY (2010)</b>	<b>SAARJAVI (1991)</b>	<b>MOORE (1985)</b>	<b>KOLE-SNIDJERS (1999)</b>
<b>Aims &amp;Hypotheses</b>	3	2	2	1	2	3	3	3	1	1	3
<b>Inclusion Criteria</b>	3	3	3	3	2	3	3	3	1	1	3
<b>Demographic Sample</b>	3	1	3	3	3	3	3	3	2	3	3
<b>Baseline Assessment</b>	3	3	3	3	3	3	3	3	2	3	3
<b>Well- Matched Control Group (S)</b>	3	2	1	2	2	3	3	3	0	3	3
<b>Outcome Measure (Patients)</b>	3	3	2	3	2	3	2	2	3	2	2
<b>Outcome Measure (Non- Patients)</b>	3	0	3	3	3	3	3	3	3	3	0
<b>Intervention Defined</b>	3	3	3	3	3	3	3	3	2	3	3
<b>Randomisation Process</b>	2	3	3	1	1	3	3	3	1	1	1
<b>Therapist Experience</b>	1	1	3	0	2	2	2	0	0	0	0
<b>Treatment Fidelity</b>	0	1	0	1	3	0	1	3	0	0	2
<b>Attrition</b>	3	3	3	2	2	3	3	3	0	2	2
<b>Statistical Analysis</b>	2	3	3	3	3	3	3	2	1	2	2
<b>Results</b>	3	3	3	3	3	3	3	3	3	3	3
<b>Sufficient Power</b>	1	1	3	1	1	3	3	3	1	1	3
<b>Follow- Up</b>	1	3	2	3	1	3	2	3	3	3	3
<b>Total Score</b>	37	35	40	35	36	44	43	43	23	31	36
<b>Percentage Score</b>	77%	73%	83%	72%	75%	91%	89%	88%	44%	62%	80%
<b>Qualitative Rating</b>	<b>High</b>	<b>High</b>	<b>High</b>	<b>Adequate</b>	<b>Adequate</b>	<b>High</b>	<b>High</b>	<b>High</b>	<b>Low</b>	<b>Adequate</b>	<b>High</b>



## **Population/Sample**

Recruitment methods were multi-pronged, with most utilising existing Pain Service structures. These methods included direct referral from pain management teams and other hospital services, posters and flyers in local community settings and email communication from existing research group and patient databases. The latter methods may have introduced bias due to participant self-selection; in accordance with existing literature, it is unlikely patients with the highest levels of pain intensity and distress would engage in research studies.

Six papers analysed dyads comprised of adults and long-term romantic partners (Abbasi et al., 2012; Kole-Snijders et al., 1999; Miller et al., 2013; Moore & Chaney, 1985; Ramke et al., 2016; Saarijarvi, 1991) with the remaining studies focusing on adolescent and parent dyads, (Law et al., 2015; Levy et al., 2010; Palermo, 2009). Subtypes of chronic pain conditions included chronic headache, back pain, abdominal pain, musculoskeletal pain and ‘mixed’ persistent pain conditions.

The number of dyads (i.e. patient and one significant other) ranged from  $n = 36$  (Abbasi et al., 2012) to  $n = 273$  (Palermo, Law, Fales, et al., 2016), with 10 of the 11 studies achieving a sample of 40 dyads or more. The overall number of participant dyads totalled 1,083, with a mean group size of 43.

The participants across studies ranged between 7 and 64 years of age; mean ages ranged between 11 and 14.7 for studies with child participants, and 24 and 49 for studies with adult participants. In line with chronic pain demographic data, all but one study (Moore & Chaney, 1985) skewed female, with patient groups ranging from 51% to 75.9% female.

10 studies reported on attrition rates, with 7 studies achieving a retention rate of 80% or more, and a further 3 achieving between 61% and 79%. One study did not report on attrition rates (Saarijarvi, 1991).

## INTERVENTIONS

Below is a summary of the interventions;

### COGNITIVE BEHAVIOURAL THERAPY (CBT) INTERVENTIONS

Seven reports evaluated studies that utilised CBT. One paper evaluated a Social-Learning CBT intervention (SLCBT), three evaluated internet-delivered CBT, another utilised a telephone- based intervention, and two trialled the use of group-CBT.

#### **a. Social Learning CBT (SL-CBT) for Children and Adolescents**

Levy et al. (2010), evaluated a brief CBT intervention for children and teenagers with persistent abdominal pain ( $n = 200$ ) and their parents. Delivered across three 75-minute sessions by trained therapists, SLCBT contains didactic, experiential and relaxation elements. Clinicians spent time with parents and children alone (the order being their choice), then both together. Parents' responses to their children's pain complaints and children's coping responses were targeted, with the pain education control group well-matched for time and attention.

#### **b. Web-Based Management of Adolescent Pain for Children and Adolescents**

Three studies evaluated an internet-delivered CBT programme for adolescent patients and their parents. Web-Based Management of Adolescent Pain (Web- MAP) promotes

behavioural and cognitive coping strategies, pain education, activity scheduling and parental operant and communication strategies. Regular homework assessments and daily diaries of activity limitation were recorded, with dyads completing fillable responses to queries (e.g. listing current stressors), which were then tailored and personalized with subsequent instructions. The Web-MAP intervention totalled 9 hours; 4 hours of patient modules, 4 hours of parent modules, and a 1-hour session with an online coach.

In one large multicentre trial (Palermo, Law, Fales, et al., 2016) the adolescent sample ( $n = 273$ ) contained a mixture of chronic pain conditions. Web-MAP treatment was compared to a well-matched attention control: internet pain education, with pain information compiled from public websites. The CBT experience and supervision of the online coaches for Web-MAP was well documented, with the equal participation of patients and parents a key feature. This multicentre trial was an extension and improvement of an earlier single-centre study (Palermo et al., 2009), with smaller sample ( $n = 48$ ) limited power and a waitlist control group for comparison.

A third study utilised the Web-MAP patient-parent protocol (Law et al., 2015) and trialled it as an adjunctive intervention to specialised headache treatment. In total, 83 adolescents (aged 11-17, recruited directly from a chronic headache clinic) participated, with the intervention group compared to a standard 'headache treatment only' control, which was comprised of medication management, face-to-face CBT and physical therapy. Effect sizes were reported for all three Web-MAP studies.

### **c. Telephone CBT (Adult Patients)**

One paper (Ramke et al., 2016) evaluated the effects of an additional telephone consultation for adult couples managing persistent pain. Four telephone consultations with the partner were added to an intensive PMP, which ran for consecutive dates over 3 weeks ( $n = 93$ ). Facilitated by a qualified Psychologist with experience in chronic pain populations, the ACI intervention group was compared to the PMP only. Adapted from a protocol for spouse-assisted coping skills training (Keefe et al., 1996), the intervention was supported by a formal manual and dyadic communication guidelines, incorporating education, cognitive restructuring as well as operant behavioural principles.

### **d. Spouse-Assisted Group CBT (Adult Patients)**

Adapting Keefe's spouse-assisted CST protocol, Abbasi et al. (2012) evaluated a 7-session spouse-assisted group programme ( $n = 36$ ), enhancing cognitive and behavioural coping skills. Patients were already undergoing a multidisciplinary PMP, with the spouse-assisted group intervention (with six dyads) compared to patient-only group CBT and standard medical care. With a focus on psychoeducation and goal-setting, the intervention was delivered by qualified clinical psychologists, albeit with no specific details of facilitator experience provided.

A second study used spouse-assisted CBT protocol (Moore & Chaney, 1985). Patients and spouses attended eight twice weekly sessions facilitated by clinical psychologists and co-therapists in training, with content presented in an informal lesson discussion format. This was compared to a waitlist control and a non-dyadic group programme, although homework exercises, treatment fidelity and participant compliance were not reported.

#### Dyadic OBT (Adult Patients)

Two papers evaluated a purely operant behavioural treatment (OBT), with theoretical foundations within the principals of Fordyce (1976). The first study (Kole-Snijders et al., 1999) evaluated spouse-assisted coping skills training within an operant-conditioning program in a large sample of adults with chronic lower back pain ( $n = 116$ ). Over 7 sessions, spouses received guidance and education on the management of chronic pain behaviours; they were encouraged to reinforce only healthy pain behaviours in the home. This study utilised several control groups; a condition with weekly patient group discussion, a waitlist condition, as well as a standard operant behavioural treatment for patients alone.

A second study (Turner & Jensen, 1990) utilised OBT and reinforcement principles in a group format ( $n = 96$ ). Group sizes ranged from 5- 10 dyads, with spouses, attending 5 of the 8 sessions. Couples were presented with information on positive behaviour reinforcement and solicitous responses, aiming to facilitate communication between spouses. The group behavioural intervention was also paired with aerobic exercise, with each aspect of the intervention compared to a waitlist control.

#### Couple Systems Therapy (CT) for Adult Patients

Saarijarvi (1991) used couple systems therapy in an adult patient sample (CT). Couples ( $n = 43$ ) were randomly assigned to either a control group or the intervention group. Five CT sessions were delivered by two family therapists, although the extent of the facilitator experience was not reported. Active listening was the central therapeutic technique, with the two therapists alternating passive and active roles in questioning, modelling communication styles for the couple. The CT intervention focused on relational structure, hierarchical organization and boundary characteristics. However, the control group was poorly defined.

## Motivational interviewing (MI) for Adult Patients

Miller et al. (2013) evaluated an intervention comprised of a single session therapeutic assessment using a Motivational Interviewing (MI) approach. Prior to the assessment, couples ( $n = 47$ ) in which one spouse had chronic pain completed surveys about pain, mood, marital satisfaction. Participants were randomly assigned to one of two groups: a tailored assessment of their marriage and pain coping that incorporated motivational interviewing strategies, or a control condition that included education about the gate control theory of pain.

## OUTCOME MEASURES

Several outcome measures were used to assess psychological distress.

### Measures in Adult Populations

#### **Depression Anxiety Stress Scale (DASS)**

The DASS (Lovibond & Lovibond, 1995) is a 42-item scale measuring depression, anxiety and stress. The patient rates statements (e.g., ‘I felt that I was using a lot of nervous energy’) on a 4-point Likert scale from 0 to 3. High scores correspond with a higher level of anxiety, depression or stress. Good psychometric properties have been established, with use in chronic pain populations helpful due to DASS not relying on somatic symptoms (Sarda, Nicholas, Pimenta, & Asghari, 2008).

#### **Beck’s Depression Inventory (BDI)**

The BDI (Eccleston et al., 2005) is a 21-item, self-report questionnaire measuring depression symptoms (Beck, et al., 1961). The BDI has been widely used within chronic pain populations due to its good psychometric properties; internal consistency for the BDI ranges from 0.73 to 0.92 across literature, with a mean of .86 (Beck, Steer, & Garbin, 1988).

### **Centre for Epidemiologic Studies Depression Scale (CES-D)**

The CES-D (Radloff, 1977) is comprised of 20 items where participants rate how often they experience depressive symptoms, such as restless sleep, poor appetite, and feeling lonely. Response options range from 0 to 3 for each item, with total scores ranging from 0 to 60, with high scores indicating higher levels of depression. Reliability, validity, and factor structure have been successfully established across a range of ages and other demographic characteristics (Lewinsohn, Seeley, Roberts, & Allen, 1997).

### **Brief Symptom Inventory (BSI)**

The Brief Symptom Inventory (Derogatis & Melisaratos, 1983) is a shortened version of the Symptom Checklist-90-R (SCL-90-R) which assesses symptoms of psychological distress symptoms, namely somatization, depression, anxiety, phobic anxiety, hostility and obsessiveness. Both the test-retest and internal consistency of the BSI are evidenced to be good, with high convergence with established scales such as the MMPI (Derogatis & Melisaratos, 1983).

### **Minnesota Multiphasic Personality Inventory Short Form (MMPI-168)**

The MMPI-168 (Overall, Hunter, & Butcher, 1973) measures psychopathology and personality in adult populations. In Moore's (1985) study, a 168-item short form was scored in the standard manner to yield 13 scores only (Overall & Gomez-Mont, 1974). Scales Hs (Hypochondriasis), D (Depression), and Hy (Hysteria), were utilised as they were most relevant to chronic pain populations.

## **Emotional Style Questionnaire**

Initially developed by Cohen, Doyle, Turner, Alper, and Skoner (2003), 'negative affect' is measured on an 18-item instrument, with both high and low arousal states used in the statement. Participants respond to 9 positive items (e.g. energetic, calm) and 9 negative items (e.g. sad, on edge) on a scale from 0 to 4. Higher scores correlate with negative affect and emotional states. Cohen and colleagues (2003) evidenced good internal reliability (Cronbach's  $\alpha = 0.81$ ) and external validity across the assessments.

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## **Measures in Child and Adolescent Populations**

### **Bath Adolescent Pain Scale (BAPQ)**

The complete BAPQ contains 61 items comprised of 7 subscales. Two of these subscales, Depression and Pain-Specific Anxiety, were used to assess adolescent emotional functioning. The measure uses a 2-week response frame and a 5-item Likert scale (0 = never, 4 = always). The Depression scale scores range from 0 to 30. Pain-specific Anxiety scale scores range from 0 to 28.

### **Revised Child and Anxiety and Depression Scale (RCADS)**

The RCADS is a 47-item, youth self-report questionnaire pertaining to specific anxiety disorders as well as low mood. It also offers a parent report version. The RCADS has evidenced good re-test reliability on its subscales (Chorpita, Moffitt, & Gray, 2005). Internal consistency for the RCADS subscales has ranged from good to excellent across languages and demographics (Piqueras, Martín-Vivar, Sandin, San Luis, & Pineda, 2017).



### **Children's Depression Inventory (CDI)**

The CDI is a 27-item self-report measure of childhood and adolescent depression and an extension of the Beck Depression Inventory (BDI). The CDI yields a total score from five subscales: Negative Mood, Ineffectiveness, Anhedonia, Negative Self-Esteem and Interpersonal Problem, with participants rating statements on a 5-point Likert scale. It has been favoured in studies exploring adolescent fibromyalgia with evidenced good internal consistency and psychometric properties (Libby & Glenwick, 2010).

### **Multidimensional Anxiety Scale for Children (MASC)**

The MASC (March, Parker, Sullivan, Stallings, & Conners, 1997) is a self-report questionnaire used to obtain information on anxiety symptoms in young people . The 39-item questionnaire assesses emotional, cognitive, physical, and behavioural symptoms and has demonstrated good clinical utility and psychometric properties in both children and adolescents (Wei et al., 2014).

## MAIN FINDINGS

### **I. Interventions using CBT**

CBT interventions varied in the form of dyad-type, delivery format, duration and demographic samples. Overall, the main findings indicated that all CBT-dyad groups reduced psychological distress, although the statistical differences between dyad and individualised CBT programmes were generally negligible.

#### **a. Web-MAP for Adolescent-Parent Dyads**

Palermo et al.'s (2009) study used Web-MAP in a child and adolescent sample (aged from 11-17,  $n = 48$ ) alongside a waitlist control. In the internet treatment group, there were significant reductions in depressive symptoms post-treatment which were maintained at 3-month follow-up, demonstrating a medium effect size ( $d = 0.7$ ). However, no significant differences were found between treatment and waitlist-control groups from pre-to post-treatment, or at the follow up. Some study limitations were evident, such as in the use of a waitlist control group (where participants continued with normal medical care) where treatment expectancy effects are frequently encountered. Furthermore, a lack of attention control made it difficult to disentangle intervention from placebo effects, and the study only examined data at a single 3-month follow-up period.

Palermo et al., (2016) subsequently trialled Web-MAP in a much larger multicentre study ( $n = 273$ ). Notably, this paper also reported on the emotional functioning of the parent as well as the adolescent. Using an internet-delivered education group as the control group, there were small treatment effects in both patient and parents (relative to the control group) for both depression and anxiety scores at baseline to posttreatment. However, like Palermo's earlier

study, the heterogeneity of the sample (in both age and chronic pain subtype) was arguably obscuring some treatment effects, and treatment fidelity was not assessed in either study.

In a chronic headache population (Law et al., 2015), no significant difference was found in depressive symptoms between adjunctive Web-MAP and standard headache management at post-treatment or at 3-month follow-up ( $n = 83$ ). A key limitation of this study was the significant variability of the ‘standard care’ in the control group, with each patient receiving different combinations of face-to-face CBT, physical therapy and medication input. Although both intervention and control groups did report a significant decrease in depressive symptoms from baseline to post-treatment, the effects of Web-MAP were difficult to delineate from the effects attributable to standard care.

#### **b. SL-CBT for Adolescent-Parent Dyads**

Levy et al. (2010) evaluated a brief SL-CBT programme, with treatment effects only evidenced in parent-reported child depression, which was statistically significant at post treatment. Parental reporting of their own solicitous responses coincided with these results, as significant decreases in levels of punishing responses were recorded. However, there were no treatment effects in child-reported depression outcomes, which raises questions about the reliability of emotional affect ratings within dyads.

#### **c. Telephone-Based Intervention (ACI) – for Patient-Partner Dyads**

Ramke et al. (2016) sampled adult dyads with mixed chronic pain conditions ( $n = 45$ ), evaluating a four-session CBT-orientated telephone intervention (ACI) for partners of patients enrolled concurrently in a PMP. ACI did not demonstrate significant improvements in depression or anxiety scores when compared to the control group (PMP only). Although

both groups evidenced reduced distress and disability levels from pre- to post-treatment, it is likely that the PMP-only was a highly effective intervention on its own, and the lack of significant differences were due to ceiling effects. The study was also underpowered; given small differences found between the groups, a much larger sample was required to detect the estimated large effect sizes for psychological distress.

#### **d. Spouse -Assisted Group CBT for Patient-Partner Dyads**

Abbasi et al. (2012) found significant reductions in both kinesiophobia and rumination for those who attended a group CBT program with spouses when compared to individualised group CBT treatment. These effects were maintained at 3-month follow-up. However, the study was under-powered ( $n = 36$ ) and the pain duration of patients was markedly long in this small sample, which may have impaired treatment efficacy. Moreover, no detail of facilitator expertise was provided.

Similarly using a spouse-assisted group CBT intervention, Moore and Chaney (1985) reported that levels of depression were not affected by treatment when compared to patient-only group CBT and a waitlist control. This intervention was underpowered, so the findings are difficult to extrapolate. Therefore, spousal input was likely not required for treatment gains, as similar benefits were observed in individual group CBT.

### **I. Operant Behavioural Treatment for Patient-Partner Dyads**

#### **Dyadic OBT**

Kole-Snidgers (1991) compared various conditions of a dyadic OBT programme (with adjunctive coping skills training, group discussion or 'as usual') to a waitlist control. The group spousal training within the OBT programme successfully reduced negative affect

across all three treatment conditions compared to controls ( $\chi^2(2) N = 149 > 17.4, p < 0.001$ ). There were no significant differences in outcomes between the various OBT conditions. The intervention was adequately powered, but experienced high attrition rates (27%) that were not addressed by the authors, leading to questions regarding the acceptability of this approach.

In a similar study Turner (1990) assessed dyadic OBT in groups across two conditions (with and without aerobic exercise), as well as an aerobics exercise group on its own. At six and 12-month follow ups, all three treatment groups significantly improved from pre-treatment  $F(5.34) = 8.48, p < 0.001$  in terms of depression scores. However, there were no significant differences between the groups and control, and there appeared no apparent benefit of spousal involvement. The study did not provide detail on the randomisation process, and was underpowered to detect between group changes with a sample size of 96.

## **II. Couple Systems Therapy**

### **Couples Systems Therapy**

The study by Saarijarvi (1991) reported that Systems Therapy for couples was effective in reducing psychological distress, with the treatment group evidencing significant reduction in depression ( $p = 0.05$ ) and anxiety ( $p = 0.02$ ) scores and increases in marital satisfaction (compared to treatment as usual) at 12 months. Interestingly, this effect was only observed in the male participants, with no significant differences recorded in women. Notably, male distress scores were significantly higher in the treatment group at baseline, which may account for the gender differences.

At five-year follow-up, the decrease in distress was maintained for the treatment group, providing some evidence for this approach, although power and effect sizes were not reported.

### **III. Motivational interviewing**

#### **Motivational Interviewing**

Miller et al. (2013) demonstrated that couples in the motivational assessment group experienced significant decreases in pain severity and negative affect ( $b = -3.26$ ,  $SE = .85$ ,  $t = .383$ ,  $p < .001$ ), and increases in positive mood from baseline to post assessment at 1 month, relative to the education control group. These results were promising, and the effects for positive and negative mood were medium to large ( $d = .69$  and  $d = .68$ ) respectively. This single session intervention was not particularly resource intensive, and could feasibly be integrated into a range of longer treatment programmes.

## **DISCUSSION**

### **Observations**

Despite the heterogeneity and methodological weaknesses in the reviewed studies, overall the results suggest dyadic interventions are effective for chronic pain populations. However, although within participant effect sizes suggest dyadic interventions are effective, they did not achieve statistically better outcomes than existing individualised or other active treatment. Six of the eleven studies did not achieve statistical power to detect between group difference, which should influence concrete evaluations of treatment efficacy.

It is apparent that this is an area of research still in its infancy, as it remains challenging to draw conclusions from diverse approaches and wide-ranging demographic samples. This review, does capture, however, a more holistic overview of the existing evidence for dyadic interventions in CP populations, and may prove useful in catalysing further studies as the research area extends.

It is useful to note that the aforementioned ‘type’ of dyadic intervention varied depending on CP population demographics (Badr et al., 2019). Despite ostensibly equal dyadic participation in treatment (Law et al., 2015; Palermo, Law, Bromberg, et al., 2016), interventions for children and adolescents tended to take the “dyad-assisted’ approach (Mellor et al., 2019), positioning the parent in a purely supportive role within the intervention. The sampled adult interventions (Moore & Chaney, 1985) more actively involved spouses in the treatment and focussed on dyadic functioning as a unit and addressed both partners’ needs and concerns.

Studies where the dyadic intervention was embedded in an existing treatment package or adjunctive (Abbasi et al., 2012; Law et al., 2015) made it challenging to clarify what patient improvements were attributable to the dyadic intervention. Moreover, the included CBT interventions incorporated many similar techniques to the OBT treatments; the demarcation between the two approaches was often opaque. As Bahr et al. (2016) notes, dyadic interventions will often not outwardly specify a strict theoretical allegiance, but will incorporate different techniques and exercises from several perspectives.

#### Interventions

The evidence remains mixed as to which dyadic intervention was most effective in reducing levels of psychological distress. The evidence for Web-MAP (Law et al., 2015; Palermo,

Law, Bromberg, et al., 2016) was compelling given the size of the adolescent participant sample and the robustness of the study design, which achieved the highest quantitative and quality rating. Remotely-delivered CBT is an increasingly popular intervention across psychological presentations due their feasibility and accessibility (Alberts, 2018). It is interesting to observe that dyadic interventions are in tandem with this trend in the wider literature. In Palermo et al.'s (2016) study, the involvement of a parent significantly reduced depressive symptoms compared to pain education alone.

In the patient-partner sample, Miller et al. (2013) demonstrated that brief motivational assessment led to significant decreases in pain severity and negative affect, with medium to large effect sizes. Although comprised of a modest sample size, these are promising results due to the intervention's brevity and efficacy. This single session intervention was not particularly resource intensive and could feasibly be integrated into a range of other treatment programmes, especially given the compatibility of the Motivational Interviewing paradigm with other therapeutic frameworks. From a clinical perspective it would be useful to observe whether these two intervention would be as effective in the opposite population, i.e. whether Web-MAP can be effectively adapted for patient-partner dyads and an MI interview between parent and child would demonstrate the same significant effects.

From a theoretical perspective, the results of this review also lend support to an 'interpersonal' model of pain, where CP is a phenomenon significantly influenced by social context, not solely the patient's cognitive traits (Romeo et al., 2017). With pain literature pivoting towards the influence of significant others in terms of pain expression (McCracken, 2005), catastrophising (Sullivan, 2012) and psychological distress (Meredith, Strong, & Feeney,



2006) future reviews of dyadic interventions can provide the lynchpin to guide and propel these interpersonal and ‘dyadic’ perspectives forward.

### Strengths and Limitations of Review

The review has several strengths, given that it is the first review to synthesis evidence for dyadic CP interventions based on study design, not dyad type (see Smith et al., 2019). This ostensibly offers a more holistic perspective to the dyad evidence base, evaluating how the intervention operationalised overarching concepts of behavioural reinforcement and empowered non-patient participants. The search strategy was systematic and was mindful to source literature from a variety of sources, and included seminal studies from over 30 years ago.

There are nevertheless limitations to the present review. First was the heterogeneity of the population samples, as this review includes studies from CP patients across the life span (children, adolescents and adults), who are typically demarcated when synthesising evidence for effective treatments. Certain types of treatments (such as Web-MAP) have been designed for child and adolescent populations and so, it is difficult to extrapolate these findings to the wider adult pain population. Secondly, the likelihood of publication and language bias is high, given the omission of non-English language studies and dissertations.

Thirdly, it is notable that 26 additional studies were identified through ‘hand searching’ and not through the original search criteria. Due to the absence of frequently used terms for types of chronic pain in the original search criteria, it is likely that relevant studies may not have been detected.

On the other hand, all 11 studies were rated by a second rather to minimise bias, with high

inter-rater reliability. The stringent inclusion criteria and quality rating ensured homogeneity of study designs, which was prudent given the lack of homogeneity of the sample. This review provides an effective summation of the evidence base across the diverse CP population, and given the limited number of studies, can anchor future reviews as the evidence base continues to grow.

### Future Research

Future research will benefit from comparing the aforementioned types of dyadic intervention (partner–assisted, resource–intensive or more purely dyadic) in similar populations (Badr et al., 2019). If significant others are permitted to enter the complex dynamics of psychotherapy, it is necessary to establish and document the type and extent of the non-patient participation within the dyadic approach.

If this area of literature continues to expand as expected, future reviews should be more restrictive in terms of the study inclusion, namely by age and dyad type. Mixed method studies (incorporating qualitative analysis of therapeutic sessions) could also enrich the existing evidence and our theoretical understanding of these complex interpersonal processes.

### Summary and Conclusion

The review set out to explore the evidence for dyadic interventions in reducing psychological distress in CP populations, although several studies were limited by modest sample size and limited statistical power. The evidence overall suggests reasonable support for dyadic approaches, but more research is needed to clarify whether the results from the highest quality studies (Web-MAP in adolescents and MI in adults) can extend to the wider CP population, outside their ordained demography.

Dyadic interventions appear as successful as individualised ones, but the quality of the evidence (small sample sizes, limited power) means that we cannot yet state whether they are superior. Broad assessment tools for distress may have obscured some of the additional benefits of dyadic interventions, and could be addressed in future reviews.

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## **Chapter 2: Empirical Project**

### **Attachment Style in Adult Patient and Caregiver Populations living with Chronic Pain**

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## Abstract

**Objective:** The study aimed to explore the predictive power of attachment style of both patients and significant others in determining levels of depression, pain-related disability, self-efficacy and psychological flexibility.

**Method:** Using a quantitative cross sectional design, 158 adults (containing a subsample of 78 patient-partner dyads) with various persistent pain conditions completed questionnaires assessing attachment style, psychological distress, pain-related disability, self-efficacy and psychological flexibility. Hierarchical multiple regression was used to explore the relationship between attachment and other constructs. Conditional process analysis was used to explore attachment's indirect influence on psychological distress through pain intensity and pain catastrophizing.

**Results:** Patient Attachment Avoidance was a significant predictor of depression and self-efficacy, but not pain disability or psychological flexibility. Partner Attachment Avoidance was a significant predictor of the patient's psychological flexibility in the dyadic subsample. In the patient-only sample, relationship between pain intensity and distress through pain catastrophizing was amplified at different levels of attachment avoidance.

**Conclusions:** Patient attachment avoidance was a significant predictor in levels of depression and self-efficacy compared to other established predictors. However, it did not significantly predict levels of pain disability or psychological flexibility. The influence of partner/caregiver attachment in psychological flexibility could be further examined in future Acceptance and Commitment Therapy Trials. Longitudinal studies examining attachment style and the pain experience are warranted.

## Introduction

Pain refers to ‘an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage’ (Treede, 2018). Despite its threatening connotations, ‘acute’ pain forms an evolutionary warning system, signaling a threat of tissue damage and need for immediate action.

In contrast, ‘chronic’ pain (CP) persists beyond normal tissue healing time, or more than 12 weeks after onset (Treede, 2018). Recent epidemiological studies estimate at least one fifth of the general population in the United States and Europe are affected by a persistent or intractable pain condition (de Souza et al., 2017). CP symptomology ranges significantly in duration, intensity and site; from widespread fibromyalgia to chronic headache. Due to its high prevalence rates and estimated £5 billion burden on the UK’s National Health Service (Maniadakis & Gray, 2000), investigations into efficacious treatments for CP have acquired increasing interest.

## Psychological Constructs

Unmanaged CP has psychological and physiological consequences, with well-evidenced associations between CP and psychological distress (Sheng, Liu, Wang, Cui, & Zhang, 2017). Clinical studies demonstrate CP is associated with severe depression in 30-60% of the pain population, often in concurrence with major physical and social ramifications (Lee, Choi, Nahm, Yoon, & Lee, 2018). CP patients with depression have a poorer prognosis than those without (Sheng et al., 2017), with the two conditions closely related in terms of onset and progression, mutually catalyzing the progress and severity of the other. A pervasive and disabling mental health disorder, depression scores are a frequent metric used to evaluate the success of pain management programmes (Kemani, Kanstrup, Jordan, Caes, & Gauntlett-Gilbert, 2018).

The relationship between CP and psychological constructs is complex, with literature positing various models accounting for CP's development, progression and maintenance. Three significant constructs have emerged across empirical studies; pain-catastrophizing (a patient's magnification of threat in response to pain), pain disability (self-reported physical impairment due to pain) and self-efficacy (confidence in one's own self- motivation, control and behaviour). The complex interrelationships between these factors have underpinned several large-scale cognitive-behavioural therapy (CBT) trials (Meredith, Strong, & Feeney, 2006), and are well-established as predictors and outcomes across CP literature.

A fourth construct, psychological flexibility (PF) emerged as a key variable in Acceptance and Commitment Therapy (ACT) CP trials, albeit generally in smaller, non-blinded and less robust clinical studies. PF refers to the ability 'to stay in the present moment regardless of unpleasant thoughts, feelings, and bodily sensations' (Hoffmann, Rask, Hedman-Lagerlöf, Ljótsson, & Frosthalm, 2018) with ACT emphasising value-orientated living, rather than the cognition-challenging, emblematic of CBT.

Despite the methodological limitations within its younger literature base, several small but well-controlled ACT studies evidenced PF as a change mechanism for CP, exerting positive influences in levels of pain severity, disability, distress, and quality of life (Feinstein et al., 2011; Gentili et al., 2019; Talaei-Khoei, Fischerauer, Lee, Ring, & Vranceanu, 2017).

## **Towards Interpersonal Models of Pain**

A consistent feature in CP research is an adherence to individualised treatments and CP models: the ‘intrapersonal’ perspective (Romeo, Tesio, Castelnuevo, & Castelli, 2017). Few dispute whether close relationships and social factors influence the pain experience; there is widespread consensus that CP is a source of stress for partners and caregivers of patients, whose affect and behaviours in turn influence patient pain behaviours (McCracken, 2005; Meredith, 2016; Dueñas et al., 2016).

A growing literature base has provided empirical support for an ‘interpersonal’ CP model, and illustrated the predictive capacity of ‘dyadic’ factors. In a cross-sectional study of adult CP patients, McCracken (2005) first demonstrated how solicitous (or sympathetic) responses from partners reinforce CP behaviours by inviting positive attention, with punishing responses fuelling a desire for patients to more actively show their suffering. These findings have since been replicated in studies across a range of CP conditions and demographic groups (Alschuler & Otis, 2013; Cunningham, Hayes, Townsend, Laures, & Hooten, 2012; Vriezekolk, Peters, van den Ende, & Geenen, 2019). Yet a consistent limitation across studies is a reliance on measures of indirect, perceived responses from the patient’s perspective, not the partners or caregivers. As this is unlikely to account for complex interactive processes, more recent work has pivoted to ‘attachment’ to explore CP’s interpersonal processes.

## **Attachment Style**

Bowlby’s (1951) attachment theory provides a model of development and interpersonal functioning, stemming from the early affectionate bonds between infants and primary caregivers. Through evolutionary necessity the formation of a close relationship provides a ‘secure base’ for the infant, facilitating their exploration of the environment, as well as a

safety net in the presence of threat (Bowlby, 1951). The receptiveness of this caregiver forms an ‘attachment style’ as an adult; an enduring, life-long ‘internal working model’ (IWM), influencing strategies for need satisfaction and emotional regulation carried forward into adulthood. Attachment ‘style’ corresponds to the adult’s interpersonal expectations learned from this early bond; there is some evidence to suggest that adults choose partners who confirm their existing beliefs about attachment relationships (Frazier, Byer, Fischer, Wright, & DeBord, 1996). For patients with CP, Mikail, Henderson, and Tasca (1994) suggest that pain activates the threat system and attachment-derived cognitions, which influences affect, beliefs and behaviours.

There remains little consensus in the attachment literature as to how to best assess attachment style (Forsythe, Romano, Jensen, & Thorn, 2012), making comparisons within the evidence base challenging. In CP literature, attachment is often operationalised as dimensional over categorical, with scales of attachment anxiety, avoidance and security among the most frequently cited in empirical studies (Fraley, Roisman, Booth-LaForce, Owen, & Holland, 2013).

In adults, securely attached CP patients value relationships, and flexibly balance independence with intimacy and support- seeking, and willingly explore difficult memories and feelings related to pain. In contrast, insecure preoccupied (or anxious) attachment is characterised by disproportionate concern within close relationships and excessive emotional expressiveness. Finally, insecure avoidant attachment in CP populations presents as the patient’s minimisation of interpersonal experiences and memories, exhibiting excessive self-reliance when managing their pain (Davies, Macfarlane, McBeth, Morriss, & Dickens, 2009).

## **Attachment and Chronic Pain Outcomes**

A growing number of studies have evidenced strong associations between attachment style and CP constructs. Significant positive relationships have been demonstrated between insecure attachment and higher levels of threat appraisal (Martinez, Miro, Sanchez, Mundo, & Martinez, 2012), psychological distress (Maunder & Hunter, 2008) inappropriate use of social support (Kizuki & Fujiwara, 2018) and pain-related disability (McWilliams, Cox, & Enns, 2000). More recently PF has also demonstrated strong relationships with attachment variables; PF was evidenced to be negatively correlated with attachment anxiety and identity diffusion (Salande and Hawkins, 2017).

Due to attachment's emphasis on internal working models, this research has also utilised intra-individual frameworks, neglecting how partner and caregiver attachment informs patient affect regulation, behaviour and the individual's overall pain experience. Only one study by (Monin, Zhou, & Kershaw, 2014) has sampled attachment style in both patients and caregivers, albeit in an older population with specific musculoskeletal pain.

Furthermore, the nature of the relationship between the individual's attachment style and pain intensity remains opaque. Literature has found no direct association between pain intensity and attachment style (Andersen, Elklit, & Vase, 2011) with some suggesting attachment influences the pain experience through indirect pathways. This is corroborated by the fact that the most robust associations have been found between attachment style and measures of pain catastrophizing, a well-established mediator of the relationship between pain intensity and depression (Wood, Nicholas, Blyth, Asghari, & Gibson, 2016).

### *Aims*

The current study aims to identify whether attachment style is a predictor of depression in chronic pain patients, and if so, the path of influence from pain intensity to depressive symptomology. It will also investigate the explanatory power of attachment style compared to other psychological constructs linked to pain (namely self-efficacy, disability and psychological flexibility) as predictors of distress.

In addition, the study aims to contribute to the knowledge of how the attachment style of significant others is associated with the patient's pain experience. It has been suggested that the inclusion of partners and caregivers in psychological interventions may optimise treatment outcomes in chronic pain patients (Mitchell, 2008). If the attachment style of both patients and partners are found to be significantly associated with depression and other outcomes, instruments assessing attachment style may prove to be clinically useful tools in tailoring psychological treatment to the needs of the patient. It may also provide support of an interpersonal model of chronic pain; it ostensibly shed light on whether pain behaviours are reinforced or extinguished in social contexts.

### *Hypotheses*

#### **Hypothesis 1**

It was hypothesised that attachment style (either anxious or avoidant) would predict a significant amount of variance in depression ( $H_1$ ).

Due to the statistical analyses covering two participant samples (overall and dyadic) and the imputation of anxious and avoidant attachment as discrete variables,  $H_1$  is comprised of four 'sub-hypotheses', labelled a - d;



## *H1*

- a) The patient's levels of anxious attachment will predict a significant amount of variance in depression
- b) The patient's levels of avoidant attachment will predict a significant amount of variance in depression
- c) The partner or caregiver's levels of anxious attachment will predict a significant amount of variance in patient depression
- d) The partner or caregiver's levels of avoidant attachment will predict a significant amount of variance in patient depression.

## **Hypothesis 2**

It was also predicted that the influence of pain intensity on depression (mediated by pain catastrophizing) would be moderated by the attachment insecurity of both the CP patients and their partner or caregiver (Hypothesis 2 or H<sub>2</sub>). In contrast to the other hypotheses (which were developed prior to data collection), H<sub>2</sub> was partially informed and developed after accessing the data and conducting initial analyses. This is often necessary for complex model building; to assess the data to tailor the specific conditional process models needed for H<sub>2</sub>.

## **Hypothesis 3 - 5**

Similarly comprised of four sub-hypotheses, it was predicted that patient and partner attachment would predict patient levels of self-efficacy (Hypothesis 3a -d), pain disability (Hypothesis 4a -d) and psychological flexibility (Hypothesis 5a-d).

## METHODOLOGY

### **Design**

The present study utilised a quantitative cross-sectional design. All patients and respective dyadic counterparts completed a web-based survey, on a one-off basis. The self-report online questionnaire consisted of seven standardised instruments, measuring attachment style, pain intensity, psychological distress, level of physical impairment, self-efficacy, pain catastrophizing and psychological flexibility, as well as clinical and demographic variables.

### **Ethical Approval**

Ethical approval was sought and granted by the University of Edinburgh Doctorate in Clinical Psychology Program Ethics Committee and the NRES Committee of South Central Hampshire, 19/SC/0234 (see Appendix C for documentation).

### **Ethical Considerations**

No risks, harms or disadvantages were anticipated from participation in the study. All participants declared a diagnosis of chronic pain. The opening page of the study outlined the survey's content and any potential risks. The study was anonymous and informed consent was obtained separately from both patient and non- patient participants.

### **Statistical Power and Sample Size**

Previous literature examining relations between pain intensity, pain catastrophizing and distress have typically found moderate to large effects for between actor and partner (Monin et al., 2014)

Subsequently, power analyses were conducted to specify the sample size required to detect a medium effect size, in a multiple regression. For overall model fit, Green's 'rule of thumb'

formula) (Green, 1991) suggests the formula  $50 + 8m$  (where  $m$  is the number of predictor variables), to have adequate power to detect the significance of the overall  $R^2$ . To determine the statistical significance of individual predictors, Green also provides a second rule of thumb of  $104 + m$  for total sample size.

This overall formula was used to ascertain the sample size required, as it led to the higher sample number than the formula for individual predictors. With 8 predictors at a power of .80 (80%), and an alpha level of .05, a sample size of 114 was suggested as the minimum sample size to detect moderate effects or larger.

## PARTICIPANTS

### i. **Patients**

In order to be included in the study, participants were required to have a current diagnosis of chronic pain; be aged 18 or over and consider themselves fluent in English. In clinical settings, pain is described as ‘chronic’ if it has persisted for longer than three months, with ‘chronic pain’ now recognised as a condition in its own right (McGhie & Grady, 2016).

Criterion for exclusion included individuals diagnosed with cancer-related pain, or any form of acute pain (where pain duration was less than 12 weeks, or attributable to recent tissue damage).

### ii. **Partners and Caregivers**

Non-patient participants in the dyad were required to be aged 18 and over and fluent in English. ‘Partners’ were required to have been in the relationship with the patient participant for longer than six months.

A ‘caregiver’ was defined as an individual providing the patient participant with a minimum of 4 hours of care per day, or help with at least one activity of daily living. In this study, ‘caregivers’ were required to be in non-paid roles.

## MEASURES

The following validated self-report measures were completed:

### i. **Numerical Pain Intensity Scale (NRS)**

The NRS is a numeric scale which allow participants to rate the intensity of their pain. This study operationalised the ‘pain severity’ item on the Brief Pain Inventory. A ranking of 0 indicated ‘no pain’, with 10 denoting ‘worst possible pain’.

In previous literature exploring NRS scales, Cronbach alpha rates across the four NRS scales have ranged from 0.77 to 0.91 (Miró et al., 2016). The Cronbach’s Alpha for the present study (using current, declared average and summative average NRS scores) was 0.76.

### ii. **Pain Catastrophizing Scale; (Sullivan, Bishop, & Pivik, 1995)**

The PCS is a 13-item instrument, which asks participants to reflect on past experiences, and to indicate the degree to which they experienced each of 13 thoughts or feelings when experiencing pain. It utilises a 5-point scale, with 0 indicating ‘not at all’ and 4 indicating ‘all of the time’.

The PCS yields a total score and three subscale scores; rumination, magnification and helplessness. The PCS has been shown to have adequate to excellent internal consistency

(coefficient alphas: rumination = .87, magnification = .66, and helplessness = .78). In the present study, the Cronbach's Alpha was .95, representing good reliability.

iii. **Hospital Anxiety and Depression Scale, HADS (Zigmond & Snaith, 1983))**

The HADS is a 14 item measure of psychological distress, with seven items relating anxiety and seven to depression. Participants are asked to indicate their response to statements such as, 'I feel tense or wound up' on a 7 point Likert scale. Turk et al. (2015)) evidenced good psychometric properties for the HADs in pain populations, namely high internal consistency, good convergent validity, and sensitivity to change following analgesic interventions.

For the current study subscale scores were used, with higher scores indicating greater psychological distress. In the present study, the Cronbach's Alpha was .81 for anxiety and .73 for depression, representing good reliability.

iv. **The Pain Disability Questionnaire, PDQ (Anagnostis, Gatchel, & Mayer, 2004)**

The PDQ evaluates functional disability and physical impairment in patients with pain and other musculoskeletal disorders. Participants rate the accuracy of 15 items on a 6 point Likert score. Total disability scores range from 0 (perfect function) to 150 (total disability).

Anagnostis et al. (2004) compared the validity and responsiveness of the PDQ favourably to other traditional measures of functional status. In literature, the PDQ'S test-retest reliability ranges from 0.94 to 0.98, with a Cronbach's alpha coefficient of 0.96. In the present study, the Cronbach's Alpha was .90, representing good reliability.

v. **The Experiences in Close Relationships – Revised (ECR-R) Questionnaire  
(Fraley, Waller, & Brennan, 2000)**

The ECR-R is a 36-item measure of adult attachment style. The ECR-R measures two subscales of attachment: Avoidance and Anxiety, each with 18 items. People who score highly on the ‘Avoidant’ scale find discomfort with intimacy and seek independence. Participants who score highly on the ‘Anxious’ subscale are inclined to fear rejection and anticipate abandonment.

Participants rate statements such as ‘I am afraid I will lose my partner or caregiver’s love’ on a 7 point Likert scale. A rating of 7 indicates ‘Strongly Agree’, with 1 indicating ‘Strongly Disagree’. For this research items were randomized, with 13 items reverse keyed. The word ‘romantic’ in 16 items was removed to enable the ECR-R’s applicability to caregivers,

Although a total score of ‘Attachment Insecurity’ is possible by combining ‘Anxiety’ and ‘Avoidant’ scores, the present study maintained the delineation between the scales for analysis, with maximum scores of 126 for both. In the present study, the Cronbach’s Alpha was for Anxious and Avoidant attachment was 0.94 and 0.91 respectively, representing good reliability.

vi. **The Pain Self-Efficacy Questionnaire, PSEQ, (Nicholas, 2007)**

PSEQ is a brief, 10-item questionnaire, assessing the confidence levels of individuals (self-efficacy) with chronic pain in performing activities. Tonkin (2008)) suggests the PSEQ can provide a guide to how patients will engage in an activity increase or exercise program.

Items relate to a range of functions, namely socializing, work attendance and coping without medication. Participants rate confidence levels on a 1-7 Likert Scale. Total scores range between 0 and 70, with higher scores indicating higher levels of self-efficacy.

In pain populations, internal consistency (Cronbach's Alpha = 0.92) and test-re-test reliability over a three-month period have been demonstrated as excellent (Asghari & Nicholas, 2001). In the present study, the Cronbach's Alpha was 0.94 representing good reliability.

vii. **The Comprehensive Assessment of ACT Processes, CompACT; Francis (Francis, Dawson, & Golijani-Moghaddam, 2016)**

The CompACT is a 23-item questionnaire measuring psychological flexibility, as conceptualized by the Acceptance and Commitment Therapy Model. Biglan, Hayes, and Pistorello (2008)) define the construct as "the ability to contact the present moment more fully as a conscious human being and to change, or persist in, behaviour when doing so serves valued ends'.

Participants rate the extent to which they agree or disagree with 23 statements on a 7 point Likert Scale, with a total score calculated from 3 sub-scales (Openness to Experience,

Behavioural Awareness and Valued Action). Higher scores indicate improved psychological flexibility, which has strong associations with improved pain outcomes.

Francis et al. (2016) suggests the CompACT remedies some key issues with extant ACT-specific measures, namely problems with construct and discriminant validity in the AAQ-II. There is also evidence to support the CompACT's coherent three-factor structure, with good internal consistency and a theory-consistent relationship with other variables (Francis et al., 2016). In the present study, the overall Cronbach's Alpha was 0.90, representing good reliability.

## PROCEDURE

### **Recruitment**

Participants were identified through NHS, third sector and online pathways. Recruitment materials included leaflets and posters (see Appendix C), and were disseminated in Pain Management Services across five health boards in NHS Scotland. The Trainee Clinical Psychologist also attended third sector Pain Association Scotland meetings, and delivered presentations outlining the study's content and purpose to potential participants.

All recruitment materials contained a QR code and the web link to the online study's information page. The opening webpage detailed all necessary information, such as content and estimated completion time of the online study.

Online recruitment materials were also posted on official social media accounts created for the study, as well as UK-based forums on Facebook, HealthUnlocked and Twitter. Two separate tick-box mechanisms for the two sections of the study (for patients and their



respective partners / dyad, where applicable) indicated the participants' understanding, and informed consent to participate.

### **Online Study**

The questionnaire was bifurcated into two sections; the first for patient participants and the second for partner/caregivers.

Patient participants completed all seven aforementioned questionnaires, and subsequently indicated whether a partner or caregiver would complete the second section. Non-patient participants completed the ECR-R questionnaire only. Informed consent was obtained separately, with partners and caregivers unable to view the answers within the other half of the questionnaire.

### **Recruitment**

158 adults (all of whom declared a diagnosis of a chronic pain condition) completed the online questionnaire. Within this sample, a subgroup of caregivers or a long-term partner completed Section 2 of the study, forming 78 patient-caregiver dyads. Thus the total number of participants, including single patients ( $n = 80$ ) and patients with significant others ( $n = 78$ ) and their partner/caregivers ( $n = 78$ ) was 236.

11 patient participants were removed due to missing data >20%, bringing the total number of pain patients included in the study to 147.

## Overview of Statistical Method

To ensure assumptions of parametricity were met, preliminary analyses were conducted on the dataset. No violations of the normality, linearity, homoscedasticity or multicollinearity assumptions were found, in line with variance inflation factor and tolerance statistics (namely, Durbin Watson, Cook and Mahalanobis Distances). Missing data accounted for 9% of the overall dataset; subsequent analysis through Little's MCAR test revealed that the data was missing at random (Little's MCAR = 12013,  $df = 12109$ ,  $p = 7.13$ ).

## Analytic Plan

All analyses were conducted using Statistical Package for the Social Sciences, Version 25 (SPSS v.25).

In order to test H<sub>1</sub>, H<sub>3</sub>, H<sub>4</sub> and H<sub>5</sub>, several regression methods were considered. As attachment style is a more recent, less established predictor in the chronic pain literature, hierarchical regression was selected. Hierarchical regression allows the variables to be entered into the model in stages; by entering attachment variables at a Stage 2, we would be able to clarify its unique predictive capacity, whilst controlling for known predictors at Stage 1.

In past studies, these methods have been used to build subsequent conditional process analysis models (Gillanders, Ferreira, Bose, & Esrich, 2013; Gillanders, Sinclair, MacLean, & Jardine, 2015) clarifying the predictive capacity of each construct prior to investigation of more complex relationships (H<sub>2</sub>).

## RESULTS

### PRELIMINARY ANALYSIS

#### i. Sample Characteristics

To optimise the completion of the online survey, no identifiable or demographic information was requested on the study's opening page at point of participation. Descriptive statistics for each of the seven instruments are denoted below in Table 3.

**Table 3**

*Descriptive Statistics for predictor and outcome variables with normative comparisons*

Variable	Possible Range	Min	Max	Mean	SD	Normative Data	
						Mean	SD
<b>Predictors:</b>							
<i>i. Patient</i>							
Pain Intensity (NRS)	0-10	2	10	6.48	1.57	Not	Available
Pain Disability (PDQ)	0-150	17	148	101.97	27.05		
Pain Catastrophizing (PCS)	0-50	1	52	30.12	13.50	29.8	13.9 <sub>c</sub>
Pain Self-Efficacy (PSEQ)	0-60	1	58	22.14	13.53	20.7	13.3 <sub>c</sub>
Attachment Anxiety (ECR-R)	1-7	1	7	3.92	1.58	3.56	1.12 <sub>b</sub>
Attachment Avoidance (ECR-R)	1-7	1	6.33	3.90	1.34	2.92	1.19 <sub>b</sub>
<i>Psychological Flexibility (CompACT)</i>	0 - 138	42	124	74.17	17.79	Not	Available
a. Openness to Experience	0-60	12.56	56	29.42	9.32		
b. Behavioural Avoidance	0-30	4.82	27	14.48	4.90		
c. Valued Action	0-48	11.36	48	30.44	7.61		
<i>ii. Partner</i>							
Anxious Attachment (ECR-R)	1-7	1	6.17	2.62	1.44	3.56	1.12
Avoidant Attachment (ECR-R)	1-7	1	6.28	2.85	1.97	2.92	1.19
<b>Outcome</b>							
HADS Depression	0-21	5.00	15.00	11.90	2.55	6.14 <sub>a</sub>	3.76
HADS Anxiety	0-21	21.00	21.00	12.87	4.57	3.68 <sub>a</sub>	3.07

*<sup>a</sup> HADS Normative Data from (Crawford, Henry, Crombie, & Taylor, 2001), <sup>b</sup> ECR-R Normative Data from (Fraley et al., 2000) <sup>c</sup> Nicholas et al., 2019)*

ii. *Prevalence of Distress*

Using the standard HADs thresholds of >8 (Bjelland, Dahl, Haug, & Neckelmann, 2002), 71.4% of the sample met the clinical threshold for anxiety symptoms, with 75% reporting clinical levels of depression. The mean anxiety scores were 12.87 (*SD*: 4.57); the mean for depressive symptoms was 11.90 (*SD*: 2.55).

iii. *Covariate Analysis*

To identify any potential confounding variables, analysis of variance (ANOVA) and t-tests for categorical and dependent variables were conducted. Notably, the relationship status of participants was determined by whether Section 2 of the questionnaire was completed: single participants living independently, or participants who described themselves as currently within a close relationship. No significant differences were found (see Appendix F), and therefore neither were included as a covariate in subsequent analyses.

iv. *Correlation Analyses*

Table 4 denotes weak to strong correlations in predicted directions, aligning with extant research and theory. The finding that the outcomes of psychological distress (anxiety and depression) significantly correlated with levels of pain disability, catastrophizing, intensity, self-efficacy and attachment insecurity is consistent with previous literature.

Of note was that the ECR-R scores (measuring attachment insecurity) for patients and partners significantly correlated, which had not yet been investigated in extant literature. This aligned with our theoretical assumptions; that increased attachment insecurity in one partner has close associations with insecure attachment in their dyadic counterpart.

To preserve statistical power, variables that did not significantly correlate with target variables (depression, self-efficacy, pain disability and psychological flexibility) were excluded from regression models. This was prudent; although overall sample size surpassed the recruitment target ( $n = 147$ ) and was powered to detect medium effect sizes with the retention of 7 predictors ( $\alpha = 0.05$ ,  $\beta = 0.8$ ), the smaller dyadic sub-sample ( $n = 78$ ) required preservation of power. However, due to the aforementioned theoretical predictions, all dyadic sample regression models included partner ECR-R scores.

**Table 4**

*Correlation Matrix between predictor variables and outcome variables ( $n = 147$ )*

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
1. NRS Pain Intensity	1										
2. PDQ Pain Disability	.43**	1									
3. ECR-R Anxious Attachment	.16*	.33**	1								
4. ECR-R Avoidant Attachment	.15	.35**	.69**	1							
5. PSEQ Pain Self-Efficacy	-.25**	-.79**	-.35**	-.42**	1						
6. CompACT Psychological Flexibility	-.07	-.30**	-.35**	-.32**	.36**	1					
7. PCS Pain Catastrophising	.29**	.45**	.52**	.41**	-.54**	-.25**	1				
8. ECR-R Anxious Attachment (Partner/Caregiver)	-.02	.14	.57**	.56**	-.14	-.15	.18	1			
9. ECR-R Avoidant Attachment (Partner/Caregiver)	.03	.11	.50**	.57**	-.17	-.30**	.16	.65**	1		
10. HADS Anxiety	.29**	.44**	.54**	.48**	-.44**	-.38**	.64**	.24*	.24*	1	
11. HADS Depression	.28**	.73**	.51**	.54**	-.81**	-.42**	.64**	.25*	.21	.63**	1

*All correlations are Pearson's  $r$  \*\*  $p < 0.01$  level, \*  $p < 0.05$  level, NRS: Numerical Rating Scale, PDQ: Pain Disability Questionnaire, ECR-R: Experiences in Close Relationships-Revised Adult Attachment Questionnaire, PCS: Pain Catastrophising Questionnaire, HADS: Hospital Anxiety and Depression Scale*

## HYPOTHESIS 1: Prediction of Depression (HADS)

To understand the strength of attachment in predicting levels of depression, the predictor variables were entered into two hierarchical regression models; a model for the overall sample ( $n = 148$ ), and a model pertaining to dyads only, which included partner-reported variables ( $n = 78$ ). Established predictors (pain intensity, pain disability, psychological flexibility, pain catastrophizing and pain-self-efficacy) were entered at Step 1, with attachment style entered at Step 2. The full results are presented in Table 5.1 and 5.2.

The final model with seven predictors accounted for 72.8% of the variance in depression (Adj  $R^2 = .728$ ), with the overall equation highly significant ( $F_{(7,138)} = 50.040$   $p < .001$ ) and represented a large effect size of  $f^2 = 2.676$ . Of the individual predictors, pain disability ( $\beta .200$ ,  $p < .05$ ), psychological flexibility ( $\beta -.118$ ,  $p < .05$ ), pain catastrophizing ( $\beta .239$ ,  $p < .001$ ) and self-efficacy ( $\beta -.473$ ,  $p < .001$ ) were significant in comparison to the other predictors.

The variables entered into the model prior to ECR-R together accounted for 70.6 % of the variance. When entered into the model at Step 2, Attachment Style accounted for 2.2% of the variance in depression over and above established predictors; this change in  $R^2$  was statistically significant ( $F_{(2,131)} = 5.246$ ,  $p < .05$ ) and represented a small effect size ( $f^2 = 0.08$ ). Attachment avoidance was highlighted as a significant predictor of depressive symptoms in the overall sample ( $H_{1a}$ ) and thus,  $H_1$  was partially supported.

In the sub-sample of dyads (patients with a partner/caregiver), the final model found that the six predictors accounted for 74.6% of the variance, Adj  $R^2 = .746$ , with the final equation highly significant ( $F_{(6,69)} = 33.375$ ,  $p < .001$ ) and representing a large effect size of  $f^2 = 2.93$ .

To meet normality and linearity assumptions and variance inflation parameters (Menard, 1995), PSEQ scores were removed from this particular regression model.

**Table 5:** Hierarchical Regression for prediction of psychological distress: depression

Variables	$\beta$	$t$	$p$	$R_2$	Adj. $R_2$	$\Delta R_2$	$p$
<b>5.1 OVERALL SAMPLE (<math>n = 148</math>)</b>							
<i>DV: HADS Depression</i>							
<b>Model 1: Constant</b>		5.663	.000	.706	.695	.706	<.001
NRS Pain Intensity	-.019	-.354	.724				
PDQ Pain Disability	.200	2.548	.012*				
CompACT Psychological Flexibility	-.128	-2.550	.012*				
PCS Pain Catastrophising	.239	4.173	.000**				
PSEQ Pain Self-Efficacy	-.473	-5.741	.000**				
<b>Model 2: Constant</b>		4.074	.000	.728	.713	.022	<.001
NRS Pain Intensity	-.019	-.376	.707				
PDQ Pain Disability	.209	2.733	.007*				
CompACT Psychological Flexibility	-.091	-1.817	.072				
PCS Pain Catastrophising	.189	3.117	.002*				
PSEQ Pain Self-Efficacy	-.435	-5.321	.000**				
Patient ECR-R Attachment Anxiety	.053	.796	.427				
Patient ECR-R Attachment Avoidance	.134	2.093	.038*				
<b>5.2 DYAD SUB- SAMPLE (<math>n = 78</math>)</b>							
<i>DV: HADS Depression</i>							
	$\beta$	$t$	$p$	$R_2$	Adj. $R_2$	$\Delta R_2$	$p$
<b>Model 1 : Constant</b>		1.351	.181	.742	.727	7.42	<.001
NRS Pain Intensity	-.193	-2.767	.007*				
PDQ Pain Disability	.542	7.384	.000**				
CompACT Psychological Flexibility	-.118	-1.764	.082				
PCS Pain Catastrophising Scale	.502	7.317	.000**				
<b>Model 2 : Constant</b>		.763	.448	.746	.724	.004	<.001
NRS Pain Intensity	-.189	-2.653	.010*				
PDQ Pain Disability	.544	7.285	.000**				
CompACT Psychological Flexibility	-.107	-1.490	.141				
PCS Pain Catastrophising Scale	.488	6.953	.000**				
Partner ECR-R Attachment Anxiety	.052	.639	.525				
Partner ECR-R Attachment Avoidance	.021	.249	.804				

Method: Hierarchical

Of the seven predictors, only the patient's self-reported pain intensity ( $\beta = -.1891, p < .05$ ), disability ( $\beta = .544, p < .001$ ) and levels of catastrophizing ( $\beta = .488, p < .001$ ) were significant predictors of depression.

When entered into the model at Step 2, Attachment Style accounted for 0.4% of the variance in depression; this  $R^2$  change was not statistically significant ( $F_{(2,69)} = .571, p = .568$ ).

Therefore, H<sub>1</sub> remains only partially supported; attachment style (avoidance) of the individual appeared to influence levels of depression (H<sub>1b</sub>), yet anxious attachment (H<sub>1a</sub>) and the attachment style of significant others did not (H<sub>1c</sub> and H<sub>1d</sub>).

#### HYPOTHESIS 2: Conditional Process Analysis for Distress (HADS)

The multiple linear regressions models demonstrated the comparative strength of predictors in relation to levels of depression. However, in order to investigate direct and indirect effects of predictor and criterion variables, conditional process analysis (Hayes, 2013) can be used to reveal more complex relationships. This method allows the simultaneous modelling of indirect effects through moderation and mediation pathways.

Based on the correlation and regression analysis (Table 4.1), and the significance of attachment avoidance in predicting levels of depression), we suggested a model that aligned with theoretical predictions. We predicted that pain intensity would influence psychological distress (using total HADs distress scores, as only one outcome variable can be entered) indirectly through pain catastrophizing.

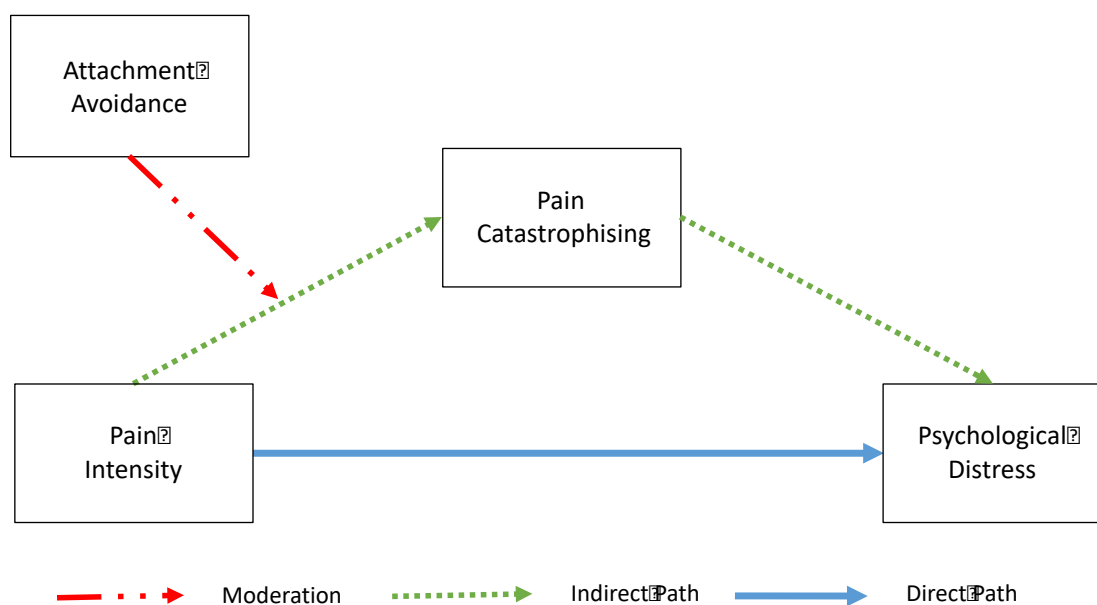
In addition, we hypothesised that this path would be moderated by the attachment style of the patient or amplified by a patient's attachment avoidance (see Figure 3 below for conceptual



diagram). Patients with high attachment avoidance typically downplay distress and displays of pain behaviour, and are less likely to fear abandonment, and ostensibly, are also less likely to catastrophize about their pain (Davies et al., 2009). The predictive capacity of attachment avoidance for depression specifically (shown in in Table 4) guided model construction, as well as pain catastrophizing's well evidenced role as a mediator between pain intensity and distress (Wood et al., 2016).

Using PROCESS macro for SPSS (Hayes, 2013) Model 7 generated bias corrected 95% bootstrap confidence intervals for the indirect effects using 5,000 bootstrap samples.

**Figure 2.** *Conditional Indirect Effect Conceptual Diagram- Model 7 (Hayes)*



Surprisingly, pain intensity did not directly influence levels of psychological distress.

Confidence intervals (see Table 6) surrounding the indirect effect of avoidant attachment did not span zero, indicating a significant indirect effect was found at low levels ( $\beta = -0.282$ , 95%

CI: -.0721 to -.1180,  $p < .001$ ) moderate levels ( $\beta = -.1381$ , 95% CI: -.2700 to -.0416,  $p < .001$ ) and high levels of attachment avoidance ( $\beta = 0.2480$ , 95% CI: -.4544 to -.1027,  $p < .001$ ).

The results suggest that attachment avoidance amplifies the relationship between pain intensity, catastrophizing and depression. The relationship between pain intensity and distress through pain catastrophizing is amplified at low, moderate and high levels of attachment avoidance on the ECR-R. Consequently, H<sub>2</sub> is supported by the models.

**Table 6:** *Conditional indirect effects of pain intensity through catastrophizing at values of attachment avoidance (N = 147)*

Avoidant Attachment (ECR-R)	Pain Intensity		
	$\beta$	BCI	
		LL	UL
LOW (-23.9578 before centering)	-0.282	-.0721	-.1180
MODERATE (0.000 before centering)	-.1381	-.2700	-.0416
HIGH (23.9578 before centering)	-.2480	-.4544	-.1027
Total model: $R^2 = .256$ , $p < .0001$ , $f^2 = .76$			
5,000 bootstrap samples at 95% confidence interval			

## MULTIVARIATE ANALYSIS FOR SECONDARY HYPOTHESES

### Hypothesis 3: Prediction of Pain Self-Efficacy

Following an identical analytic strategy to H1, a second set of hierarchical regressions were conducted in order to address Hypothesis 3, with pain self-efficacy entered as the criterion variable. The results for both the overall and dyadic subsample are presented in Table 7.

Within the overall sample, the total equation account for 67.6% of the variance in self-efficacy ( $\text{Adj } R^2 = .676$ ) and was highly significant ( $F_{(6,132)} = 48.915, p < .001$ ), representing a large effect size of  $f^2 = 2.08$ . Of the individual predictors, pain disability ( $\beta = .657, p < .001$ ), pain catastrophizing ( $\beta = .273, p < .001$ ), and attachment avoidance ( $\beta = .170, p < .05$ ) were significant in comparison to the other predictors.

At Step 1, the variables together accounted for 67.4% of the variance. When entered into the model at Step 2, Attachment Style accounted for 1.6% of the variance in self-efficacy. This change in  $R^2$  was significant, ( $F_{(2,132)} = 3.307, p < .05$ ), and represents a small effect size ( $f^2 = .016$ ). Thus, H3 was partially supported, as the patient's levels of attachment avoidance (H3b) appears to significantly influence pain self-efficacy.

In the sub-sample of dyads (patients with a partner/caregiver), the seven predictors accounted for 74.3% of the variance,  $\text{Adj } R^2 = .743$ , with the overall model highly significant ( $F_{(6,64)} = 30.763, p < .001$ ) and represented a large effect size of  $f^2 = 2.89$ , yet neither attachment subscales proved significant predictors (H3c and H3d).

The variables entered into the model prior to ECR-R together accounted for 73.6% of the variance. Adding Attachment Style at Step 2 accounted for 0.6% of the variance in

depression over and above established predictors, which was not statistically significant

( $F_{(2,64)} = .693, p = .504$ ).

**Table 7:** Hierarchical Regressions for prediction of pain self-efficacy (PSEQ)

Variables	$\beta$	$t$	$p$	$R^2$	Adj. $R^2$	$\Delta R^2$	$p$
<b>7.1 OVERALL SAMPLE</b>							
<b>(<math>n = 148</math>)</b>							
<i>DV: PSEQ Pain Self-Efficacy</i>							
<b>Model 1: Constant</b>		11.480	.000	.674	.665	.674	<.001
NRS Pain Intensity	.105	1.952	.053				
PDQ Pain Disability	-.676	-11.614	.000**				
CompACT Psychological Flexibility	.083	1.601	.112				
PCS Pain Catastrophising	-.275	-4.979	.000**				
<b>Model 2: Constant</b>		11.182	.000	.690	.676	.016	<.001
NRS Pain Intensity	.103	1.937	.055				
PDQ Pain Disability	-.657	-11.392	.000**				
CompACT Psychological Flexibility	.070	1.319	.189				
PCS Pain Catastrophising	-.273	-4.549	.000**				
Patient ECR-R Attachment Anxiety	.103	1.469	.144				
Patient ECR-R Attachment Avoidance	-.170	-2.572	.011*				
<b>7.2 DYAD SUB – SAMPLE</b>							
<b>(<math>n = 78</math>)</b>							
<i>DV: PSEQ Pain Self-Efficacy</i>							
<b>Model 1: Constant</b>		8.358	.000	.737	.721	.737	<.001
NRS Pain Intensity	.103	1.465	.148				
PDQ Pain Disability	-.634	-8.646	.000**				
CompACT Psychological Flexibility	.151	2.153	.035				
PCS Pain Catastrophising	-.359	-5.249	.000**				
<b>Model 2: Constant</b>		7.589	.000	.743	.718	.006	<.001
NRS Pain Intensity	.119	1.648	.104				
PDQ Pain Disability	-.648	-8.679	.000**				
CompACT Psychological Flexibility	.122	1.620	.110				
PCS Pain Catastrophising	-.365	-5.224	.000**				
Partner ECR-R Attachment Anxiety	.083	.954	.344				
Partner ECR-R Attachment Avoidance	-.103	-1.150	.254				

Method: Hierarchical

Based on this analysis, H<sub>3</sub> remains only partially supported; attachment avoidance within the individual (H<sub>3b</sub>) influenced levels of self-efficacy, yet attachment anxiety (H<sub>3a</sub>) and the attachment style of significant others did not (H<sub>3c</sub> and H<sub>3d</sub>). Of the six predictors, only the patient's self-reported pain disability ( $\beta = -.648, p < .001$ ), and pain catastrophizing ( $\beta = -.365, p < .001$ ) were significant predictors of pain self-efficacy.

#### Hypothesis 4: Prediction of Pain Disability (PDQ)

To investigate the predictive capacity of attachment style for pain disability, two hierarchical regression models (overall and dyadic participant samples) were conducted with pain disability entered as the outcome variable, and attachment variables entered at Step 2. The results for both the overall and dyadic subsample are presented in Table 8.

Within the overall sample, the six predictors in the final model accounted for 62.8% of the variance in pain disability scores ( $\text{Adj } R^2 = .628$ ). The overall equation was significant ( $F_{(6,132)} = 39.770, p = < .001$ ) and represented a large effect size of  $f^2 = 1.688$ . Attachment style did not appear to influence pain disability scores, only pain intensity ( $\beta .229, p < .001$ ) and pain self-efficacy ( $\beta -.754, p < .001$ ) were significant in comparison to the other predictors (H<sub>4a</sub> and H<sub>4b</sub>). When entered at Step 2, Attachment Style accounted for 0.2% of the variance; this  $R^2$  change was non-significant ( $F_{(2,132)} = .302, p = .740$ ).

Similarly, within the sub-sample of dyads ( $n = 78$ ), partner attachment style (H<sub>4c</sub> and H<sub>4d</sub>) did not statistically predict the target variable; in line with extant literature, the patient's self-reported pain intensity score ( $\beta = .237, p < .05$ ), pain catastrophizing score ( $\beta = .237, p < .001$ ) and pain self-efficacy scores ( $\beta = -.218, p < .05$ ) were significant. With the seven

predictors the final dyadic model was also significant, accounted for 63.8% of the variables

( $F_{(6,64)} = 21.56$ ,  $p < .001$ , Adj  $R^2 = .638$ ) and represented a large effect size of  $f^2 = 1.76$ .

**Table 8:** Hierarchical Regressions for prediction of pain –related disability (PDQ)

Variables	$\beta$	$t$	$p$	$R^2$	Adj. $R^2$	$\Delta R^2$	$p$
<b>8.1 OVERALL SAMPLE</b>							
<b>(<math>n = 148</math>)</b>							
<i>DV: PDQ Pain Disability</i>							
<b>Model 1 : Constant</b>		12.478	.000	.642	.632	.642	<.001
NRS Pain Intensity	.229	4.250	.000**				
CompACT Psychological Flexibility	-.032	-.577	.565				
PSEQ Pain Self-Efficacy	-.742	-11.614	.000**				
PCS Pain Catastrophising	-.063	-1.001	.319				
<b>Model 2 : Constant</b>		10.887	.000	.644	.628	.002	<.001
NRS Pain Intensity	.229	4.225	.000**				
CompACT Psychological Flexibility	-.033	-.577	.565				
PSEQ Pain Self-Efficacy	-.754	-11.392	.000**				
PCS Pain Catastrophising	-.070	-1.012	.313				
Patient ECR-R Attachment Anxiety	.042	.552	.582				
Patient ECR-R Attachment Avoidance	-.056	-.766	.445				
<b>8.2 DYAD SUB- SAMPLE (<math>n = 78</math>)</b>							
<i>DV: PDQ Pain Disability</i>							
							$p$
<b>Model 1: Constant</b>		11.256	.000	.653	.632	.653	<.001
NRS Pain Intensity	.218	2.813	.006				
CompACT Psychological Flexibility	-.038	-.461	.646				
PSEQ Pain Self-Efficacy	-.207	-2.300	.025				
PCS Pain Catastrophising	-.837	-8.646	.000				
<b>Model 2: Constant</b>		10.414	.000	.669	.638	.016	<.001
NRS Pain Intensity	.237	3.050	.003*				
CompACT Psychological Flexibility	-.082	-.947	.347				
PSEQ Pain Self-Efficacy	-.218	-2.403	.019*				
PCS Pain Catastrophising	-.834	-8.679	.000**				
Partner ECR-R Attachment Anxiety	.131	1.341	.185				
Partner ECR-R Attachment Avoidance	-.177	-1.767	.082				

Method: Hierarchical

When entered at Step 2, Attachment Style accounted for 1.6% of the variance; this  $R^2$  change was non-significant ( $F_{(2,64)} = .1588, p = .212$ ). Based on this analysis  $H_{4a-d}$  are not supported, as neither the attachment style of the individual or significant others predicted pain disability.

#### Hypothesis 5: Prediction of Psychological Flexibility (CompACT)

The same analytic plan was taken in to test Hypothesis 5 and the explanatory power of attachment style (entered at Stage 2, after established predictors), in levels of psychological flexibility. The results for both the overall and dyadic subsample are presented in Table 9.

Within the overall sample, the final model accounted for 13.8% of the variance in psychological flexibility scores. The overall equation for the final model was significant, ( $F_{(6,132)} = 4.670, p < .001, \text{Adj } R^2 = .138$ ) and represented a medium effect size of  $f^2 = 0.160$ . However, none of the variables emerged as significant predictors, including the two attachment subscales entered at Step 2. Therefore,  $H_{5a}$  and  $H_{5b}$  were not supported by the model, as the patient's attachment style did not appear to influence psychological flexibility when entered at Step 2.

However, in the sub-sample of dyads, partner attachment style emerged as one of two significant predictors in the final model, of which the final equation was statistically significant and explained 25.1% of the overall variance ( $F_{(6,64)} = 4.904, p < .001, \text{Adj } R^2 = .251$ ). When entered into the model at Step 2, Attachment Style accounted for 7.4% variance; this  $R^2$  change was significant ( $F_{(2,64)} = 3.479, p = <.05$ ) and represents a moderate size ( $f^2 = 0.109$ ). Partner/caregiver attachment avoidance ( $\beta = -.365, p <.001$ ) and pain intensity ( $\beta = -$

.262,  $p < .001$ ) were demonstrated as significant influencers in levels of patient psychological flexibility (H<sub>5d</sub>).

**Table 8:** Hierarchical Regressions for prediction of psychological flexibility (CompACT)

Variables	$\beta$	$t$	$p$	$R^2$	Adj. $R^2$	$\Delta R^2$	$p$
<b>9.1 OVERALL SAMPLE</b>							
<b>(<math>n = 148</math>)</b>							
<i>DV: CompACT Psychological Flexibility</i>							
<b>Model 1: Constant</b>		5.321	.000	.122	.095	.122	<.001
NRS Pain Intensity	.079	.882	.380				
PDQ Pain Disability	-.078	-.577	.565				
PCS Pain Catastrophising	-.116	-1.178	.241				
PSEQ Pain Self-Efficacy	.225	1.601	.112				
<b>Model 2 : Constant</b>		5.831	.000	.175	.138	.053	<.001
NRS Pain Intensity	.073	.832	.407				
PDQ Pain Disability	-.076	-.577	.565				
PCS Pain Catastrophising	-.002	-.023	.982				
PSEQ Pain Self-Efficacy	.186	1.319	.189				
Patient ECR-R Attachment Anxiety	-.201	-1.758	.081				
Patient ECR-R Attachment Avoidance	-.090	-.815	.416				
<b>9.2 DYAD SUB- SAMPLE (<math>n = 78</math>)</b>							
<i>DV: CompACT Psychological Flexibility</i>							
<b>Model 1: Constant</b>		2.495	.015	.240	.194	.240	<0.001
NRS Pain Intensity	.232	1.967	.053				
PDQ Pain Disability	-.084	-.461	.646				
PCS Pain Catastrophising	.076	.548	.586				
PSEQ Pain Self-Efficacy	.435	2.153	.035				
<b>Model 2 : Constant</b>		3.369	.001	.315	.251	.074	<0.001
Pain Intensity	-.262	2.276	.026*				
PDQ Pain Disability	-.169	-.947	.347				
PCS Pain Catastrophising	.043	.315	.754				
PSEQ Pain Self-Efficacy	.324	1.620	.110				
Partner ECR-R Attachment Anxiety	.192	1.362	.178				
Partner ECR-R Attachment Avoidance	-.365	-2.595	.012*				

Method: Hierarchical



Based on this output, we posit that H5 remains only partially supported. While patient attachment and the partner/caregiver's levels of anxious attachment (H5a, H5b and H5c) did not influence levels of psychological flexibility in the patient, levels of attachment avoidance in partners and caregivers did (H5d). Thus, we suggest higher levels of attachment avoidance within partners and caregivers is associated with reduced psychological flexibility.

## **Diagnostics**

For all hierarchical regression analyses, the examination of standardised residual plots indicated that normality and linearity assumptions were met, with Durbin Watson statistics confirming assumptions of homogeneity of variance (Field, 2013). Variance inflation factors (ViF) were less than the suggested 3.3 in literature (Menard, 1995), with Cook and Mahalanobis distances similarly within suggested boundaries for all regression models (Field, 2013).

## **DISCUSSION**

### **Overview**

This study explored attachment style in relation to psychological constructs associated with the chronic pain experience, namely depression, pain disability, pain self-efficacy and psychological flexibility. Correlational analysis evidenced significant relationships between the patient-reported ECR-R subscales and these variables, aligning with extant literature. Specifically, both forms of the patient's insecure attachment (anxious and avoidant) were closely associated with established CP constructs. In overall sample, insecure avoidant

attachment emerged as the attachment predictor with the greatest explanatory power in CP outcomes.

The results suggest attachment avoidance in patients is a significant predictor of depression (H<sub>1B</sub>) after controlling for the presence of other known variables. The support for H<sub>1</sub> is a theoretically congruent finding (Beck, 1976; Bowlby, 1951), as high levels of avoidant attachment parallels the ruminative and isolationist symptomology of depression more than anxious-attachment. Similarly, its significance as a predictor in levels of patient self-efficacy (H<sub>2B</sub>) was expected (Bandura, 1990) although the direction of influence was unexpected.

There is conceptual overlap between excessive self-reliance and lack of help-seeking (attachment avoidance) and a patient's confidence in their motivation and behaviour (self-efficacy), although the inverse relationship was not the predicted direction.

Moreover, the conditional indirect effect (H<sub>2</sub>) of attachment avoidance suggests attachment is best conceptualised as operating through indirect pathways. The significant results of the moderated mediation indicate the interpersonal aspects influencing the CP patient's catastrophizing mental stances are equally potent treatment targets to the cognitive constructs themselves. This study suggests that a patient's IWM and attachment orientation may exert influence on pain appraisals (catastrophizing), and in turn could influence a patient's response to traditional CBT treatments for psychological distress. Notably, this finding mirrors the dyadic perspective increasingly taken in the pain catastrophizing literature. Although originally conceived as a discrete mental stance, 'pain catastrophizing' (Sullivan, 2012) has more recently been conceptualised as an interpersonal behaviour, emerging only when there are others to respond.

Finally, patient attachment did not predict levels of pain disability (H<sub>4a</sub> and H<sub>4b</sub>) nor psychological flexibility (H<sub>5a</sub> and H<sub>5b</sub>) in our sample. Although this is in conflict with the findings of previous work (McWilliams et al., 2000) it is possible that the different assessment instruments used for attachment, as well as idiosyncratic participant samples, may account for this divergence.

#### Dyadic Attachment Influence and Psychological Flexibility

This is one of the first studies to explore attachment style in both CP patients and their partners and caregivers. However, in our dyadic sub-sample, significant associations were not found between caregiver-reported attachment scores and patient-reported depression, pain disability and pain self-efficacy. A single previous study by Monin et al. (2014) evidenced associations between spousal-attachment and depressive symptoms using the ECR-R . However, these differences may be attributable to Monin et al.'s sample of exclusively patient-spouse relationships in older populations.

Partner and caregiver avoidant attachment (H<sub>5d</sub>) did emerge as a significant predictor for the patient's levels of PF, even after a significant portion of the variance had been addressed by the other variable. This finding warrants additional research to replicate and further explore this relationship. These results may provide preliminary support for the integration of attachment's interpersonal perspective in ACT approaches. This dovetails into the ethos of the ACT approach; PF is already considered to be a contextually-controlled variable (Gillanders et al., 2013), and from these findings, partner attachment style may be an important aspect of the patients own social context. These results suggest that if a partner is very avoidant, then their partner may become less flexible and subsequently, become entangled in difficult thoughts (Francis et al., 2016).

Future studies could focus on whether partner attachment corresponds to levels of cognition fusion and avoidance behaviour (Gillanders et al., 2015). Anchored by an ACT-informed approach, it would be interesting to explore whether partner attachment influences the behavioural regulatory impact of appraisals in patients, rather than the appraisal's specific content.

### Clinical Implications

Achieving a broader understanding of attachment in relation to depression in CP patients helps expedite the provision of interventions designed to address interpersonal, social and emotional factors in the pain experience. Assessing a patient's attachment style prior to therapeutic treatment may help therapists design treatments that circumvent the enduring strategies and expectations that propagate interpersonal difficulties and distress. Attachment may also offer explanatory capacity in terms of the development of a therapeutic alliance in treatment settings.

However, more evidence is required to identify whether attachment is a useful predictor or target in psychological interventions for CP. This cross-sectional study suggests avoidant attachment has the most potential in predicting depression, with partner-rated attachment style evidenced as a non-significant influence in the CP experience, apart from psychological flexibility.

### Study Limitations

A number of limitations deserve mention. Notably, the sample also lacks core demographic data, age, sex gender and country of origin, which were unable to be included as covariates in our analysis. This was a deliberate choice to ensure that the online data were non-identifiable.

From the sampling of the online and community group pain sessions used in recruitment, the sample is likely to be predominantly white British, which limits the generalisability of these findings. Moreover, although specific criteria were provided for partner and caregiver respondents, no detail was requested to delineate these two groups, or clarify the precise duration of the relationship with the CP patient. There was also no information requested regarding the time elapsed since an initial CP diagnosis, which is found to be a significant covariate in the literature (Bishop et al., 2015).

The study also used self-report measures for both patients and partners, which often leads to subjective bias in the instrument data. Moreover, the cross-sectional nature of the study design inhibits the ability to make any causal inferences between specific constructs. We cannot determine whether we were capturing stable or momentary aspects of a person's attachment orientation, although use of the ECR-R (compare to other attachment state measures) has been evidenced to capture a more stable attachment orientation (Xu & Shrout, 2013).

### Future Research

Future research could focus on carrying out longitudinal studies in a more specific pain population. It may also be useful to elucidate differences between types of dyad (patient-partner and patient-caregiver) and how this influences attachment orientation and other constructs. Arguably, the inclusion of objective measures (such as engagement in self-management programmes, exercise regimes, as observed by health professionals) could broaden and enrich the understanding of the patient's pain experience in relation to attachment.

## Conclusion

The aim of this study was to examine the relationships between attachment style, depression, self-efficacy, pain disability and psychological flexibility. In summary, although patient-reported attachment avoidance was a significant predictor in levels of depression and self-efficacy compared to other established variables, it did not significantly predict levels of self-efficacy or psychological flexibility.

Partner/caregiver reported attachment was not found to be a significant predictor of patient depression, self-efficacy and pain-related disability when compared to other variables. It was, however, a significant predictor of psychological flexibility, suggesting some preliminary evidence for attachment-influenced, interpersonal processes within ACT frameworks.

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## Appendices

### Appendix A: Journal Specifications



## JOURNAL OF CONTEXTUAL BEHAVIORAL SCIENCE

### AUTHOR INFORMATION PACK

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ISSN: 2212-1447

#### DESCRIPTION

The *Journal of Contextual Behavioral Science* is the official journal of the [Association for Contextual Behavioral Science \(ACBS\)](#).

Contextual Behavioral Science is a **systematic and pragmatic approach** to the understanding of behavior, the solution of human problems, and the promotion of human growth and development. Contextual Behavioral Science uses **functional principles and theories** to analyze and modify action embedded in its historical and situational context. The goal is to **predict and influence behavior**, with precision, scope, and depth, across all behavioral domains and all levels of analysis, so as to help create a behavioral science that is more adequate to the challenge of the human condition.

Contextual behavioral science is a strategic approach to the analysis of human behavior that proposes the need for a **multi-level** (e.g. social factors, neurological factors, behavioral factors) and **multi-method** (e.g., time series analyses, cross-sectional, experimental) exploration of **contextual and manipulable** variables relevant to the prediction and influence of human behavior.

The journal considers papers relevant to a contextual behavioral approach including: Empirical studies (without topical restriction - e.g., clinical psychology, psychopathology, education, organizational psychology, etc.) Brief reports on preliminary, but provocative findings Reviews (systematic reviews and meta-analyses are preferred) and Conceptual and philosophical papers on contextual behavioral science

We are particularly interested in: Papers emphasizing the study of core **behavioral processes** that are relevant to a **broad range of human problems** Papers **bridging different approaches** (e.g., connecting behavioral approaches with cognitive views; or neurocognitive psychology; or evolutionary science) Papers that **challenge** a contextual behavioral science approach from an informed perspective

The journal welcomes papers written by researchers, practitioners, and theoreticians from different intellectual traditions. What is distinctive is not a narrowly defined theory or set of applied methods but whether the methodology, conceptualization, or strategy employed is relevant to a contextual behavioral approach.

#### Special Issues

## GUIDE FOR AUTHORS

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### *Types of article*

All manuscripts must clearly and explicitly be of relevance to CBS. You may find the JCBS article "Contextual Behavioral Science: creating a science more adequate to the challenge of the human condition" helpful in assessing whether your manuscript is likely to be of interest to readers of this journal.

Articles should fall into one of seven categories:

1. Empirical research (up to 6000 words)
2. Brief empirical reports (up to 3000 words)
3. Review articles (up to 10,000 words)
4. Conceptual articles (up to 6000 words)
5. In practice (up to 3000 words)
6. Practical innovations (up to 3000 words)
7. Professional interest briefs (up to 3000 words)

Word limits exclude references, tables and figures but include the abstract

1. Empirical research. JCBS welcomes manuscripts across a breadth of domains from basic behavioral science to clinical trials. Research concerning the measurement and testing of process of change is particularly welcome. Potential methodologies include but are not limited to: randomized controlled trials, single case experimental designs, cross-sectional and prospective cohort studies, mixed-methods designs, small scale analog studies. Papers reporting null findings are also welcome if their methodology is sound and their power sufficient. Authors of such papers will need to emphasize the implications of their findings for future research and practice.

2. Brief empirical reports. Manuscripts in this section may report preliminary, provocative or replicated results. Empirically sound methodology and adequate power remain important considerations.

3. Review articles. Manuscripts reviewing a wide range of topics are encouraged as long as their content is directly relevant to CBS. Systematic reviews and meta-analyses are particularly welcome. Authors are advised to consult relevant MARS (<http://www.apa.org/pubs/authors/jars.pdf>) and PRISMA resources (<http://www.prisma-statement.org/>) when preparing such manuscripts.

4. Conceptual articles. Manuscripts in this section should address conceptual or theoretical issues relevant to CBS. This may include papers that discuss relevant philosophical assumptions and traditions, or conceptual papers which explore aspects of or inconsistencies in contextual behavioral theory and science.

5. In practice. Manuscripts in this section are designed to make CBS useful to practitioners from a wide variety of areas. Manuscripts must be written in an accessible style and should be easily understood by practitioners who are not experts in research or basic behavioral science. Manuscripts should provide both clear insights for new practitioners as well as stating the questions that remain to be answered by future research.

6. Practical innovations. Manuscripts in this section seek to apply the findings and applications of CBS to under-studied, under-served or novel areas. The scope of these manuscripts is limited only by the journal's broad mission: creating a science more adequate to the challenge of the human condition.

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A Theory section should extend, not repeat, the background to the article already dealt with in the Introduction and lay the foundation for further work. In contrast, a Calculation section represents a practical development from a theoretical basis.

### *Results*

Results should be clear and concise.

### *Discussion*

This should explore the significance of the results of the work, not repeat them. A combined Results and Discussion section is often appropriate. Avoid extensive citations and discussion of published literature.

### *Conclusions*

The main conclusions of the study may be presented in a short Conclusions section, which may stand alone or form a subsection of a Discussion or Results and Discussion section.

### *Appendices*

If there is more than one appendix, they should be identified as A, B, etc. Formulae and equations in appendices should be given separate numbering: Eq. (A.1), Eq. (A.2), etc.; in a subsequent appendix, Eq. (B.1) and so on. Similarly for tables and figures: Table A.1; Fig. A.1, etc.

### **Essential title page information**

- **Title.** Concise and informative. Titles are often used in information-retrieval systems. Avoid abbreviations and formulae where possible.
- **Author names and affiliations.** Please clearly indicate the given name(s) and family name(s) of each author and check that all names are accurately spelled. You can add your name between parentheses in your own script behind the English transliteration. Present the authors' affiliation addresses (where the actual work was done) below the names. Indicate all affiliations with a lower-case superscript letter immediately after the author's name and in front of the appropriate address. Provide the full postal address of each affiliation, including the country name and, if available, the e-mail address of each author.
- **Corresponding author.** Clearly indicate who will handle correspondence at all stages of refereeing and publication, also post-publication. This responsibility includes answering any future queries about Methodology and Materials. **Ensure that the e-mail address is given and that contact details are kept up to date by the corresponding author.**
- **Present/permanent address.** If an author has moved since the work described in the article was done, or was visiting at the time, a 'Present address' (or 'Permanent address') may be indicated as a footnote to that author's name. The address at which the author actually did the work must be retained as the main, affiliation address. Superscript Arabic numerals are used for such footnotes.

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Highlights should be submitted in a separate editable file in the online submission system. Please use 'Highlights' in the file name and include 3 to 5 bullet points (maximum 85 characters, including spaces, per bullet point).

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A concise and factual abstract is required. The abstract should state briefly the purpose of the research, the principal results and major conclusions. An abstract is often presented separately from the article, so it must be able to stand alone. For this reason, References should be avoided, but if essential, then cite the author(s) and year(s). Also, non-standard or uncommon abbreviations should be avoided, but if essential they must be defined at their first mention in the abstract itself.

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#### *Abbreviations*

Define abbreviations that are not standard in this field in a footnote to be placed on the first page of the article. Such abbreviations that are unavoidable in the abstract must be defined at their first mention there, as well as in the footnote. Ensure consistency of abbreviations throughout the article.

#### *Acknowledgements*

Collate acknowledgements in a separate section at the end of the article before the references and do not, therefore, include them on the title page, as a footnote to the title or otherwise. List here those individuals who provided help during the research (e.g., providing language help, writing assistance or proof reading the article, etc.).

#### *Formatting of funding sources*

List funding sources in this standard way to facilitate compliance to funder's requirements:

Funding: This work was supported by the National Institutes of Health [grant numbers xxxx, yyyy]; the Bill & Melinda Gates Foundation, Seattle, WA [grant number zzzz]; and the United States Institutes of Peace [grant number aaaa].

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#### *References*

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Van der Geer, J., Hanraads, J. A. J., & Lupton, R. A. (2010). The art of writing a scientific article. *Journal of Scientific Communications*, 163, 51–59. <https://doi.org/10.1016/j.Sc.2010.00372>.

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Strunk, W., Jr., & White, E. B. (2000). *The elements of style*. (4th ed.). New York: Longman, (Chapter 4).

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Reference to a website:

Cancer Research UK. Cancer statistics reports for the UK. (2003). <http://www.cancerresearchuk.org/aboutcancer/statistics/cancerstatsreport/> Accessed 13 March 2003.

Reference to a dataset:

[dataset] Oguro, M., Imahiro, S., Saito, S., Nakashizuka, T. (2015). *Mortality data for Japanese oak wilt disease and surrounding forest compositions*. Mendeley Data, v1. <https://doi.org/10.17632/xwj98nb39r.1>.

Reference to a conference paper or poster presentation:

Engle, E.K., Cash, T.F., & Jarry, J.L. (2009, November). The Body Image Behaviours Inventory-3: Development and validation of the Body Image Compulsive Actions and Body Image Avoidance Scales. Poster session presentation at the meeting of the Association for Behavioural and Cognitive Therapies, New York, NY.

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### Supplementary material

Supplementary material such as applications, images and sound clips, can be published with your article to enhance it. Submitted supplementary items are published exactly as they are received (Excel or PowerPoint files will appear as such online). Please submit your material together with the article and supply a concise, descriptive caption for each supplementary file. If you wish to make changes to supplementary material during any stage of the process, please make sure to provide an updated file. Do not annotate any corrections on a previous version. Please switch off the 'Track Changes' option in Microsoft Office files as these will appear in the published version.

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## Appendix B: Quality Assessment Checklist

Quality Criteria	Outline	Rating
<b>Aims and Hypothesis</b>	Aims, hypotheses and outcome measures clearly outlined	Good (3)
	Aims, hypotheses and outcome measures adequately outlined	Fair (2)
	Aims stated but no hypotheses given	Poor (1)
	Aims not clear and/or no outcome measures stated	Not Addressed (0)
<b>Design and Randomisation Process</b>	RCT with appropriate method of randomisation reported	Good (3)
	RCT or controlled trial but some missing information on how sample was randomized	Fair (2)
	Randomisation Process not clearly outlined	Poor (1)
	No information given regarding study's design	Not Addressed (0)
<b>Criteria for Inclusion and Exclusion in Study</b>	Inclusion and exclusion criteria clearly stated	Good (3)
	Inclusion and exclusion criteria outlined with limited information	Fair (2)
	Either inclusion or exclusion criteria not reported	Poor (1)
	Not information reported	Not Addressed (0)
<b>Sampling</b>	Population demographics and baseline assessments clearly stated, to permit comparison between intervention and control groups	Good (3)
	Adequate demographic information gathered to allow basic comparisons between intervention and control groups.	Fair (2)
	Limited information on demographic variables reported	Poor (1)
	No demographic information and/or baseline measures reported	Not Addressed (0)
<b>Control group</b>	Control group is well-matched to intervention group in terms of duration and intensity.	Good (3)
	Adequately-matched control group used with an adequately matched intervention.	Fair (2)

	Wait – list control	Poor (1)
	Inadequate information in regards to control group (duration and intensity of intervention) <b>OR</b> Control Group poorly matched, in terms of duration and intensity of intervention.	Not Addressed (0)
<b>Measures (Patient)</b>	Instruments with clearly outlined psychometric properties. Must measure psychological distress, with known psychometric properties in present population/sample.	Good (3)
	Standardized measures utilised; reliability and validity reported	Fair (2)
	Use of non-standardised measures	Poor (1)
	No outcomes measures utilised	Not Addressed (0)
<b>Measures (Non- Patient)</b>	Relevant Instruments with clearly outlined psychometric properties. Must measure psychological distress, with known psychometric properties in present population/sample.	Good (3)
	Standardized measures utilised; reliability and validity reported	Fair (2)
	Use of non-standardised measures	Poor (1)
	No outcomes measures utilised for non-patient	Not Addressed (0)
<b>Intervention</b>	Clearly defined intervention with detailed protocol	Good (3)
	Intervention is well defined but no protocol mentioned	Fair (2)
	Intervention vague and not clearly define, with no protocol	Poor (1)
	Intervention description not outlined	Not Addressed (0)
<b>Homework</b>	Home exercises described and completion rates collected and presented	Good (3)
	Home exercises assigned but no completion rates	Fair (2)
	Home exercises not assigned, with reasons outlined	Poor (1)
	Home exercises not assigned	Not Addressed (0)
<b>Training of Facilitator/Therapist</b>	Therapist/Facilitator training, expertise and experience clearly outlined. At least 12 months of experience in similar intervention.	Good (3)
	Therapist/Facilitator training and expertise reported. <12 months' experience training in similar intervention. Personal practice reported.	Fair (2)

	Therapist/Facilitator has some experience in delivering interventions, although experience is not outlined as similar to present	Poor (1)
	No experience reported	Not Addressed (0)
<b>Fidelity to Treatment</b>	Adherence to treatment protocol formally assessed. All sessions recorded or observed. All deviations reported.	Good (3)
	Fidelity assessed by checklist. Some deviations noted.	Fair (2)
	Fidelity reported but no info as to how it is measured	Poor (1)
	Fidelity not reported.	Not Addressed (0)
<b>Sample Attrition</b>	Retention greater than 80%. Attrition rates clearly outlined.	Good (3)
	Retention between 61 and 79%. Attrition rates clearly outlined	Fair (2)
	Retention less than 60% or attrition not clearly outlined	Poor (1)
	No attrition or retention rates reported.	Not Addressed (0)
<b>Statistical Analysis</b>	Method of statistical analyses reported and appropriate to study design. Confidence intervals, p-values, effect sizes reported.	Good (3)
	Method of statistical analyses reported and appropriate to study. Some information on confidence intervals and p-values reported but no effect sizes.	Fair (2)
	Method of statistical analysis not clear or not appropriate to study. P-values reported but not effect sizes.	Poor (1)
	Method of statistical analysis inappropriate and vaguely defined. No p-values reported or effect sizes reported	Not Addressed (0)
<b>Results</b>	Results clear; correspond well with initial aim/hypothesis	Good (3)
	Results reported and generally correspond to aims/hypotheses	Fair (2)
	Results not clearly reported and/or do not Correspond to aims/hypotheses	Poor (1)
	Results not related to aims/hypotheses	Not Addressed (0)
<b>Statistical Power</b>	Power calculation reported and sufficient power achieved	Good (3)
	Power calculation not reported and/or study	Fair (2)



	has reasonable sample size ( $n \geq 30$ per group) and likely to have sufficient power	
	Power calculation not reported and/or study likely to be insufficiently powered ( $n < 30$ per group)	Poor (1)
	Power calculation not reported/sample very small ( $\leq 10$ per group)	Not Addressed (0)
<b>Follow Up</b>	Length of follow up $\geq 6$ months	Good (3)
	Length of follow up $\geq 3$ months	Fair (2)
	Length of follow up $\leq 1$ month	Poor (1)
	No follow up data gathered	Not Addressed



## *Health Research Authority*

### **South Central - Hampshire A Research Ethics Committee**

Level 3, Block B  
Whitefriars  
Lewins Mead  
Bristol  
BS1 2NT

19 June 2019

Mr James Anderson  
Clinical Neuropsychologist  
NHS Grampian  
Neuropsychology Department  
Ashgrove House  
Aberdeen Royal Infirmary  
AB25 2ZN

Dear Mr Anderson

<b>Study title:</b>	<b>Attachment Style in Patients and Caregivers Coping with Chronic Pain</b>
<b>REC reference:</b>	<b>19/SC/0234</b>
<b>Protocol number:</b>	<b>CAHSS1811/01</b>
<b>IRAS project ID:</b>	<b>254015</b>

Thank you for your submission on the 3<sup>rd</sup> June 2019 responding to the Proportionate Review Sub-Committee's request for changes to the documentation for the above study.

The revised documentation has been reviewed and approved by the sub-committee.

#### **Confirmation of ethical opinion**

On behalf of the Committee, I am pleased to confirm a favourable ethical opinion for the above research on the basis described in the application form, protocol and supporting documentation as revised.

#### **Conditions of the favourable opinion**

The REC favourable opinion is subject to the following conditions being met prior to the start of the study.

University Hospitals Division

Queen's Medical Research Institute  
47 Little France Crescent, Edinburgh, EH16 4TJ

FM/AM/approval

5<sup>th</sup> July 2019, re-issued 12<sup>th</sup> July 2019

Mr James Anderson  
NHS Grampian  
Neuropsychology Department  
Aberdeen Royal Infirmary  
ABERDEEN  
AB25 2ZA

Research & Development  
Room E1.16  
Tel: 0131 242 3330

Email:  
accord@nhslothian.scot.nhs.uk

Director: Professor Tim Walsh

Dear Mr Anderson

**Lothian R&D Project No:** 2019/0093

**REC No:** 19/SC/0234

**Title of Research:** Attachment Style in Patients and Caregivers Coping with Chronic Pain

**Sponsor Reference:** CAHSS1811/01

**Participant Information Sheet:**

(Patient) and (Partner/Caregiver) Version 4, dated  
4<sup>th</sup> July 2019

**Consent Form:**

(Patient) and (Partner/Caregiver) Version 1, dated  
22<sup>nd</sup> March 2019

**Protocol:** Version 1, dated 29<sup>th</sup> March 2019

I am pleased to inform you this letter provides Site Specific approval for NHS Lothian for the above study and you may proceed with your research, subject to the conditions below.

We note that NHS Lothian is participating in this trial as a Participant Identification Centre (PIC).

Please note that the NHS Lothian R&D Office must be informed of any changes to the study such as amendments to the protocol, funding, recruitment, personnel or resource input required of NHS Lothian.

Substantial amendments to the protocol will require approval from the ethics committee which approved your study and the MHRA where applicable.

Please keep this office informed of the following study information, **which is a condition of NHS Lothian R&D Management Approval:**

1. Date you are ready to begin recruitment, date of the recruitment of the first participant and the monthly recruitment figures thereafter.
2. Date the final participant is recruited and the final recruitment figures.
3. Date your study / trial is completed within NHS Lothian.

I wish you every success with your study.

Yours sincerely

Ms Fiona McArdle  
Deputy R&D Director

CC Ms Michelle Carr, Service Director DATCC, SJH

09 July 2019

Ms Katherine Berlouis

Dear Ms Berlouis,

**PIC APPROVAL LETTER – NHS TAYSIDE**

**Title: Attachment Style in Patients and Caregivers Coping with Chronic Pain**

**Chief Investigator: Mr James Anderson**

**Local Collaborator: Professor Blair Smith**

**Tayside Ref: 2019PZ02    NRS Ref: NRS19/254015**

**REC Ref: 19/SC/0234**

**Sponsor: University of Edinburgh**

**Funder: No external funding**

Many thanks for your request for NHS Tayside to act as a Participant Identification Centre (PIC) for the above study. I am pleased to confirm that the project documentation (as outlined below) has been reviewed, registered and Management Approval has been granted for NHS Tayside to act as a PIC in this case.

Approval is granted on the following conditions:-

- **NHS Tayside is a Participant Identification Centre (PIC) only and is not a Research Site for this study.**
- **ALL Research must be carried out in compliance with the Research Governance Framework for Health & Community Care, Health & Safety Regulations, data protection principles, statutory legislation and in accordance with Good Clinical Practice (GCP).**
- **As custodian of the information collated during this research project you are responsible for ensuring the security of all personal information collected in line with NHS Scotland IT Security Policies, until destruction of this data.**
-

## Research and Development

Foresterhill House Annexe  
Foresterhill  
ABERDEEN  
AB25 2ZB



Ms Katherine Berlouis  
Psychology Student

Date 2/08/2019  
Project No 2019PC002

Enquiries to Louise  
Extension 53846  
Direct Line 01224 553846  
Email [grampian.randdpermissions@nhs.net](mailto:grampian.randdpermissions@nhs.net)

Dear Ms Berlouis

### Management Permission for Non-Commercial Research

**STUDY TITLE:** Attachment Style in Patients and Caregivers Coping with Chronic Pain

**PROTOCOL NO:** v1, 29/03/19

**REC REF:** 19/SC/0234

**NRS REF:** 254015

Thank you very much for sending all relevant documentation. I am pleased to confirm that the project is now registered with the NHS Grampian Research & Development Office. The project now has R & D Management Permission to proceed locally. This is based on the documents received from yourself and the relevant Approvals being in place.

All research with an NHS element is subject to the UK Policy Framework for Health and Social Care Research (2017 v3), and as Chief or Principal Investigator you should be fully committed to your responsibilities associated with this.

#### **R&D Permission is granted on condition that:**

- 1) The R&D Office will be notified and any relevant documents forwarded to us if any of the following occur:
  - Any Serious Breaches in Grampian (Please forward to [pharmaco@abdn.ac.uk](mailto:pharmaco@abdn.ac.uk)).
  - A change of Principal Investigator in Grampian or Chief Investigator.
  - Any change to funding or any additional funding
- 2) When the study ends, the R&D Office will be notified of the study end-date.
- 3) The Sponsor will notify all amendments to the relevant National Co-ordinating centre. For single centre studies, amendments should be notified to the R&D office directly.

All research activity must comply with the standards detailed in the UK Policy Framework for Health and Social Care Research <http://www.nhsresearchscotland.org.uk/uploads/tinymce/uk-policy-framework-health-social-care-research.pdf>, health & safety regulations, data protection principles, other appropriate statutory legislation and in accordance with Good Clinical Practice (GCP).

Any amendments which may subsequently be made to the study should also be notified to Aileen Yell, R&D Research Coordinator ([aileen.yell@nhs.net](mailto:aileen.yell@nhs.net)), as well as the appropriate regulatory authorities. Notification should also be given of any new research team members post approval and/or any changes to the status of the project.

This organisation is required to monitor research to ensure compliance with the Research Governance Framework and other legal and regulatory requirements. This is achieved by random audit of research. You will be required to assist with and provide information in regard to monitoring and study outcomes (including providing recruitment figures to the R&D office as and when required).

As custodian of the information collated during this research project you are responsible for ensuring the security of all personal information collected in line with NHS Scotland IT Security Policies, until the destruction of this data. Permission is only granted for the activities for which a favourable opinion has been given by the REC (and which have been authorised by the MHRA where appropriate).

The research sponsor or the Chief Investigator or local Principal Investigator at a research site may take appropriate urgent safety measures in order to protect research participants against any immediate hazard to their health or safety. The R&D office ([aileen.yell@nhs.net](mailto:aileen.yell@nhs.net)) should be notified that such measures have been taken. The notification should also include the reasons why the measures were taken and the plan for further action. The R&D office should be notified within the same time frame of notifying the REC and any other regulatory bodies.

I would like to wish you every success with your study and look forward to receiving a summary of the findings for dissemination once the project is complete.

Yours sincerely

**DR CHRIS MCKENNA**  
Medical Director  
NHS Fife

*Cc : Aileen Yell, R&D Research Coordinator, NHS Fife, Queen Margaret Hospital, Dunfermline  
Dr Paul Cameron, NHS Fife  
Study co-ordinator*

Administrator: Mrs Elaine O'Neill  
Telephone Number: 0141 232 1815  
E-Mail: elaine.o'neill2@ggc.scot.nhs.uk  
Website: www.nhsggc.org.uk/r&d

R&D Management Office  
West Glasgow ACH  
Dalnair Street  
Glasgow, G3 8SJ

12 July 2019

Mr James Anderson  
NHS Grampian  
Neuropsychology Department  
Ashgrove House  
Aberdeen Royal Infirmary  
AB25 2ZA

**NHS GG&C Board Approval  
Participant Identification Centre**

Dear Mr J Anderson,

<b>Study Title:</b>	<b>Attachment Style in Patients and Caregivers Coping with Chronic Pain</b>
<b>GG&amp;C HB site</b>	<b>Templeton Business Centre (East CHCP)</b>
<b>Sponsor</b>	<b>University of Edinburgh</b>
<b>R&amp;D reference:</b>	<b>GN19MH214</b>
<b>REC reference:</b>	<b>19/SC/0234</b>
<b>Protocol no:</b>	<b>V1; 29/03/19</b>

I am pleased to confirm that **Approval** has been granted for NHS Greater Glasgow & Clyde to act a **Patient Identification Centre (PIC)** for the above study.

**Conditions of Approval**

1. During the life span of the study, GG&C R&D Management Office requires the following information:
  - i. Any amendments – Substantial or Non Substantial – that may change the workload of GG&C as a PIC.
  - ii. Notification of trial/study end.

**Please add this approval to your study file as it may be subject to audit and monitoring.**

Your personal information will be held on a secure national web-based NHS database.

I wish you every success with this research study

Yours sincerely,



## 1 INTRODUCTION

### 1.1 BACKGROUND

‘Pain’ is a symptom endemic to the human experience. It can be defined as an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage.

‘CP’ (CP) however is a markedly distinct phenomenon. Defined as pain lasting longer than three months (lasting beyond normal healing time), CP is a condition that is both multidimensional and burdensome. Estimated to affect around 28 million adults in the United Kingdom unmanaged CP has evidenced long-term psychological and physiological consequences; namely depression, disability, reduced independence and lower quality of life.

### 1.2 RATIONALE FOR STUDY

With an economic burden of £5 billion annually the prevalence of CP is set to increase in accordance with the UK’s ageing population. Thus, investigations into efficacious treatments for CP, as well as explorations into its underlying psychological mechanisms, have acquired an increasing importance for the National Health Service (NHS).

Recent research has suggested that Bowlby's concept of Attachment Theory could play a key role in optimizing psychological interventions for CP. A stable construct formed in infancy, an 'attachment style' develops based upon the responsiveness of primary caregivers to their child’s needs. These responses form enduring the cognitions, behaviours, and emotion that dictate need satisfaction and emotional regulation well into adulthood.

Thus, attachment style may underpin key difference in how the patient experiences pain, interacts with health professionals and engages in interventions. Yet it is also likely that the attachment style of partners and caregivers could be a factor. Spousal behaviours have been evidenced to reinforce certain patient behaviours; influencing levels of disability, psychological flexibility, coping behaviours and pain expression in patients. As of yet however, no study has attempted to synthesise, integrate and quantify these complex processes. Thus, this is a gap the present project will hope to remedy.

## 2 STUDY OBJECTIVES



## 2.1 OBJECTIVES

### 2.1.1 Primary Objective

Does the influence of pain intensity on depression (through pain catastrophizing) differ depending on the attachment style of chronic pain patients and their partner/caregivers?

### 2.1.2 Secondary Objectives

Does insecure attachment in patients and partner coping with chronic pain predict lower self-efficacy?

Does insecure attachment in patients and partners coping with chronic pain predict lower levels of physical functioning?

Does insecure attachment style in patients and partner coping with chronic pain predict lower levels of psychological flexibility?

## 2.2 ENDPOINTS

### 2.2.1 Primary Endpoint

To have ascertained whether the effects of depression in patients with CP are influenced by the attachment style of the patient and their partner/caregiver.

### 2.2.2 Secondary Endpoints

To have ascertained whether insecure attachment in CP patients and partner/caregivers predict lower levels of self-efficacy in patients.

To have ascertained whether insecure attachment in CP patients and partner/caregivers predict lower levels of physical functioning in patients.

To have ascertained whether insecure attachment in CP patients and partner/caregivers predict lower levels of psychological flexibility in patients

## 3 STUDY DESIGN

This study will use a non-experimental, cross-sectional cohort design. It will utilise an online questionnaire (hosted by Jisc Online Surveys, formerly Bristol Online Surveys) as the means of data collection.

Patient participants will first complete a battery of self-report measures that will capture specific psychological constructs and outcomes. Participants will be asked to complete a total of seven measures with 114 individual items, without input from their partner/caregivers;

Following completion of this section, partner/caregivers will be asked to complete the second section of the questionnaire; to independently complete a ECR-R. Partners are required to complete this section straight after the patient participants, and will not be given the opportunity to go back and look at patient participant responses.

Participants without partners/caregivers will be given the opportunity to bypass this page and still record their results.

In order to maximise potential sample size, recruitment will be pooled from five different NHS Health Boards, (Grampian, Tayside, Fife, Lothian and Greater Glasgow and Clyde), third sector services and online social media platforms.

After completion will have the opportunity for their partner to complete a second ECR-R, although participants without partners will be given the opportunity to bypass this page and record their results.

#### 4 STUDY POPULATION

##### 4.1 NUMBER OF PARTICIPANTS

This study aims to recruit 122 adult participants (aged 18+) with a diagnosis of CP (and, where applicable their caregivers)

Research will be hosted within a single site within NHS Grampian (Aberdeen Royal Infirmary, Foresterhill Health Campus, Foresterhill Rd, Aberdeen AB25 2ZN)

- 4 additional Participant Identification Centres in Pain Services in
  - o NHS Fife
  - o NHS Tayside
  - o NHS Lothian
  - o NHS Greater Glasgow and Clyde

There will be an initial recruitment period of 6 months, although the online study's dataset will be active until end of the Trainee Psychologist's post (September 2020)

##### 4.2 INCLUSION CRITERIA

Participants must;

- be over the age of 18 (no upper age limit)
- have a diagnosis of CP. In clinical settings, pain is generally described as 'chronic' if it has persisted for longer than three months.
- consider themselves fluent in English
- not be diagnosed with cancer-related pain
- Suffering from acute pain, or rather pain of recent onset i.e. pain lasting less than three months.

The partners and/or caregivers of these individuals will form a secondary participant group, recruited as partners of the patient participant group. This sub-group will only complete the short, final portion of the questionnaire (ECR-R), with their participation contingent on their patient partners facilitating it.

- ‘Partners’ are required to have been in the relationship with the patient for longer than six months.
- A ‘caregiver’ is defined as an individual providing the care-recipient with a) a minimum of 4 hours of care per day or b) help with at least one activity of daily living.
- Partners/Caregivers are also required to be in non-paid roles.

### 4.3 EXCLUSION CRITERIA

Participants and their partner/caregivers will be unable to consent if they are;

- under the age of 18
- do not consider themselves fluent in English
- are suffering from cancer-related or acute pain (pain that has recurred for less than 3 months).

The exclusion of this demographic is due to the recognised distinction between chronic and cancer-related pain in both medical and psychological literature, as well as the distinction in available treatment pathways. This exclusion criterion will be clearly outlined to all potential participants.

## 5 PARTICIPANT SELECTION AND ENROLMENT

### 5.1 IDENTIFYING PARTICIPANTS

Participants will be self-referred, recruited through advertising materials at the aforementioned NHS Pain Services. No direct access to medical records or history will be necessary for this project’s recruitment.

Recruitment materials (in the form of leaflets and posters) will be made available in NHS Pain Service and at third-sector pain support meetings, with the Trainee Psychologist delivering a short, five-minute presentation explaining the content and purpose of the study. All recruitment materials will contain a QR code and a link to the online study. These recruitment materials will also be posted on official social media platforms created for the study (Twitter and Facebook). By following an online link or utilising a Quick Response (QR) code, these self-referred participants will be taken to the opening page of the online questionnaire.

These potential participants do not necessarily have to be registered patients in an NHS Pain Service, although there may be some overlap. Should they desire

to do so, these participants will also be encouraged to disseminate a link to study on social media platforms.

## 5.2 CONSENTING PARTICIPANTS

Consent will be obtained from all patient and partner/caregiver participants, should they choose to participate.

Patient participants will be required to read the initial online opening page for the study. This will comprise of an information sheets, which will take both patient participants through the online questionnaire process.

A tick box mechanism following the information page will perform as a declaration that the participant has understood the content, duration and risks of completing the questionnaire. There will be no time limit set to consider the information sheet before consenting. Following completion of the questionnaire, a debriefing page will offer participants an overview of the study, providing links to patient support groups and a hyperlink to allow them to participate in a prize draw.

Once patient participants have completed their section, the partner/caregiver participants will undertake an identical process; an information sheet, an indications of consent and a debriefing page.

A tick box mechanism is used instead of an online signature, as this would violate the anonymization of the data.

### 5.2.1 Withdrawal of Study Participants

Participants are free to withdraw from the online study at any point during the completion. This is entirely at their discretion. They will be unable to withdraw once the questionnaire is submitted.

They will be given the opportunity to re-start and complete the study from the beginning at any point in the future, but all data from incomplete questionnaires will be discarded.

## 6 STUDY ASSESSMENTS

### 6.1 STUDY ASSESSMENTS

This procedure is entirely online. The table below outlines the processes and estimated maximum completion times, in total requiring no longer than 25 minutes for both sections.

Process	Estimated Completion Time
Information Sheet and Consent for Patient Participants (Online)	4 minutes
Part I: Online Questionnaire for Patient (7 instruments)	

- (1) The Experiences in Close Relationships- Revised Questionnaire, ECR-R (Fraley, Waller and Brennan, 2000)
- (2) Numerical Pain Rating Scale

- (3) The Pain Catastrophizing Scale (Sullivan, Bishop and Pivik, 1995)
- (4) Hospital Anxiety and Depression Scale (HADS; Zigmond and Snaith, 1983)
- (5) The Pain Disability Questionnaire (Aganostis et al., 2004)
- (6) The Pain Self-Efficacy Questionnaire (Nicholas, 1998)
- (7) The CompACT (Francis, 2015) 10 minutes
- Debrief for Patient Participants (Online) 1 minute
- Information Sheet and Consent for Patient/Caregiver Participants (Online) 4 minute
- Part II: Online Questionnaire for Partner/Caregiver (1 instrument)
- The Experiences in Close Relationships- Revised Questionnaire, ECR-R (Fraley, Waller and Brennan, 2000) 4 minutes
- Debrief for Caregiver (Online) and Participation in Prize Draw 2 minutes

## 7 DATA COLLECTION

This study will use a non-experimental, cross-sectional cohort design, and therefore will only collect data at a single time point. It will utilise an online questionnaire (hosted by Jisc Online Surveys, formerly Bristol Online Surveys) as the means of data collection.

Raw scores will be converted into scaled scores where appropriate, and subsequently compiled from the following measures.

- (1) The Experiences in Close Relationships- Revised Questionnaire, ECR-R (Fraley, Waller and Brennan, 2000)
- (2) Numerical Pain Rating Scale
- (3) The Pain Catastrophizing Scale (Sullivan, Bishop and Pivik, 1995)
- (4) Hospital Anxiety and Depression Scale (HADS; Zigmond and Snaith, 1983)
- (5) The Pain Disability Questionnaire (Aganostis et al., 2004)
- (6) The Pain Self-Efficacy Questionnaire (Nicholas, 1998)
- (7) The CompACT (Francis, 2015).

This data will be inputted directly by the participants themselves, which will then be accrued and scored by the Trainee Psychologist, supervised by the CI.

### 7.1 Source Data Documentation

Items from the aforementioned standardised questionnaires will be inputted into an online questionnaire format through Jisc Online Questionnaire software. This

will enable the inputted data to be transferred to an encrypted Microsoft Excel Sheet by the administrator, then subsequently into SPSS for data analysis.

## 8 DATA MANAGEMENT

### 8.1.1 Personal Data

No personal data will be collected as part of the research project.

However, participants are given the opportunity to enter a prize draw following the completion of the online questionnaire. An email address is required in order to be entered into this Prize Draw (for a £50 Amazon voucher) which will be detailed in the recruitment materials. By following a hyperlink (thereby indicating their consent) at the end of the questionnaire, the participant will be taken to a separate Jisc questionnaire.

These email addresses will be hosted in this separate Jisc Survey to the anonymised questionnaire data, with these addresses transferred to encrypted pin-locked NHS computers. All questionnaire data will remain anonymised and unable to be linked to the corresponding email address of the participants.

### 8.1.2 Transfer of Data

Data collected or generated by the study (including personal data) will not be transferred to any external individuals or organisations outside of the Sponsoring organisation(s).

The results of this study may be summarised in published articles, reports and presentations.

All data collected during this research will be stored securely and in line with data protection guidelines. These may be used for future ethically approved research. Information provided to researchers may be provided to researchers running other research studies in this organisation and other organisations. These organisations may be universities, NHS organisations or companies involved in health and social care research. The information provided will only be used to conduct research in accordance with the UK Policy Framework for Health and Social Care Research.

### 8.1.3 Data Controller

A data controller is an organisation that determines the purposes for which, and the manner in which, any personal data are processed.

The University of Edinburgh is the data controller along with any other entities involved in delivering the study that may be a data controller in accordance with applicable laws (e.g. the site)

### 8.1.4 Data Breaches

Any data breaches will be reported to the University of Edinburgh and NHS Lothian Data Protection Officers who will onward report to the relevant authority according to the appropriate timelines if required.

## 9 STATISTICS AND DATA ANALYSIS

## 9.1 SAMPLE SIZE CALCULATION

The researcher utilised Fritz and MacKinnon's (2007) tables to calculate the minimum

sample size required to detect a mediational effect with bias-corrected bootstrapping for paths a and b. Referring to Andrews et al., (2014) et al.'s correlational medium effect sizes between pain intensity, disability and psychological functioning, it was specified that a sample of 71 participants would be required.

Utilising the comprehensive and widely utilised formula by Green (1991), power calculations specified the detection of a medium effect size. Utilising linear regression with 9 predictors at a power of .80, and an alpha level of .05, a sample size of 122 patient participants was recommended for the present study, which was selected by the researcher as the optimum minimum sample size.

## 9.2 PROPOSED ANALYSES

Anonymised data will be analysed by the Chief Investigator on password-protected personal laptops (using University of Edinburgh VPN) and encrypted NHS Laptops and PCs.

The principal research question (H1) will be addressed utilising a conditional indirect effects model: a moderated mediation analysis as outlined by Hayes (2013). Specifically, it will test whether the mediation role of pain catastrophizing between pain intensity and depression is moderated by patient and / or caregiver attachment style.

PROCESS macro (Hayes, 2018), a freely available and widely used computational programme hosted by the IBM SPSS V23 package, will be utilised for analysis. The model will correspond to Model 58 in Hayes (2013) paper; a diagrammatic representation can found in Appendix 1, representing the temporal ordering of factors.

As always, normality checks will be completed to check for violations of assumptions, due to the reduced power of analysing non-parametrically distributed data. Both indirect and direct effects will be computed in the model, with 95% confidence intervals and p-values, with statistical significance achieved for effects if  $p < .05$ .

The secondary research questions (H2-H4) will be answers through simple linear regression models, also using SPSS (PROCESS).

Participants are free to withdraw from the online study at any point. This is entirely at their direction. They will be given the opportunity to re-start and complete the study from the beginning at any point in the future, but all data from incomplete questionnaires will be discarded.

## 10 RSKS

This project is predicted to have no or few risks. Despite CP people frequently maintain active lives and (as it is one of the inclusion criteria of the study) meaningful, close personal relationships.

For completeness two minor risks have been identified. A potential burden is the length of time to complete the questionnaire itself: around 25 mins (including informed consent and debrief). This is not considered to be excessive by the researchers, nor is it in itself imagined to cause pain, be overly intrusive, and require any changes in lifestyle or significant inconvenience. The nature of the questions asked are similar to what will have been put to individuals in their interactions with caregivers and medical staff. A preliminary focus group of Pain Patients found the nature of the research appropriate, proportionate and in-fact welcome.

However, it is possible that some individuals, due to their pain or associated conditions, could find the maximum time of 25 mins (including informed consent and debrief) too burdensome. To mitigate these risks, prior to starting the participants will be notified of the questionnaire's length (around 20 minutes) as well as content (it will indicate that 'questions about mood' will be asked), with the option to stop and close the study at any time.

Participants will also be given the option to start the study again from the beginning and complete it at later date, as incomplete questionnaires will be deemed invalid by Jisc.

While not thought a significant risk by the patient group or the research team, due to the distance-based, online nature of the study, there is a potential for psychological distress that the research team will be unable to identify.

Consistent with the approach taken in secondary care or any community based or patient education session, the study will recommend approaching and reviewing things with their GP should distress occur. A debriefing page will also direct participants or local services/self-management training should they require extra support.

## 11 OVERSIGHT ARRANGEMENTS

### 11.1 INSPECTION OF RECORDS



Investigators and institutions involved in the study will permit trial related monitoring and audits on behalf of the sponsor, REC review, and regulatory inspection(s). In the event of audit or monitoring, the Investigator agrees to allow the representatives of the sponsor direct access to all study records and source documentation. In the event of regulatory inspection, the Investigator agrees to allow inspectors direct access to all study records and source documentation.

## 11.2 RISK ASSESSMENT

A study specific risk assessment will be performed by representatives of the co-sponsors, ACCORD monitors and the QA group, in accordance with ACCORD governance and sponsorship SOPs. Input will be sought from the Chief Investigator or designee. The outcomes of the risk assessment will form the basis of the monitoring plans and audit plans. The risk assessment outcomes will also indicate which risk adaptations (delete if no adaptations were possible) could be incorporated into trial design.

## 11.3 STUDY MONITORING AND AUDIT

The ACCORD Sponsor Representative will assess the study to determine if an independent risk assessment is required. If required, the independent risk assessment will be carried out by the ACCORD Quality Assurance Group to determine if an audit should be performed before/during/after the study and, if so, at what frequency.

Risk assessment, if required, will determine if audit by the ACCORD QA group is required. Should audit be required, details will be captured in an audit plan. Audit of Investigator sites, study management activities and study collaborative units, facilities and 3rd parties may be performed.

## 12 GOOD CLINICAL PRACTICE

### 12.1 ETHICAL CONDUCT

The study will be conducted in accordance with the principles of the International Conference on Harmonisation Tripartite Guideline for Good Clinical Practice (ICH GCP).

Before the study can commence, all required approvals will be obtained and any conditions of approvals will be met.

### 12.2 INVESTIGATOR RESPONSIBILITIES

The Investigator is responsible for the overall conduct of the study at the site and compliance with the protocol and any protocol amendments. In accordance with the principles of ICH GCP, the following areas listed in this section are also the responsibility of the Investigator. Responsibilities may be delegated to an appropriate member of study site staff.

#### 12.2.1 Informed Consent

The Investigator is responsible for ensuring informed consent is obtained before any protocol specific procedures are carried out. The decision of a participant to

participate in clinical research is voluntary and should be based on a clear understanding of what is involved.

Participants must receive adequate oral and written information – appropriate Participant Information and Informed Consent Forms will be provided. The oral explanation to the participant will be performed by the Investigator or qualified delegated person, and must cover all the elements specified in the Participant Information Sheet and Consent Form.

The participant must be given every opportunity to clarify any points they do not understand and, if necessary, ask for more information. The participant must be given sufficient time to consider the information provided. It should be emphasised that the participant may withdraw their consent to participate at any time without loss of benefits to which they otherwise would be entitled.

The participant will be informed and agree to their medical records being inspected by regulatory authorities and representatives of the sponsor(s).

The Investigator or delegated member of the trial team and the participant will sign and date the Informed Consent Form(s) to confirm that consent has been obtained. The participant will receive a copy of this document and a copy filed in the Investigator Site File (ISF) and participant's medical notes (if applicable).

#### 12.2.2 Study Site Staff

The Investigator must be familiar with the protocol and the study requirements. It is the Investigator's responsibility to ensure that all staff assisting with the study are adequately informed about the protocol and their trial related duties.

#### 12.2.3 Data Recording

The Principal Investigator is responsible for the quality of the data recorded in the CRF at each Investigator Site.

#### 12.2.4 Investigator Documentation

- The Principal Investigator will ensure that the required documentation is available in local Investigator Site files ISFs.

#### 12.2.5 GCP Training

For non-CTIMP (i.e. non-drug) studies all researchers are encouraged to undertake GCP training in order to understand the principles of GCP. However, this is not a mandatory requirement unless deemed so by the sponsor. GCP training status for all investigators should be indicated in their respective CVs.

#### 12.2.6 Confidentiality

All laboratory specimens, evaluation forms, reports, and other records must be identified in a manner designed to maintain participant confidentiality. All records must be kept in a secure storage area with limited access. Clinical information will not be released without the written permission of the participant. The Investigator and study site staff involved with this study may not disclose or use for any purpose other than performance of the study, any data, record, or other unpublished, confidential information disclosed to those individuals for the purpose of the study. Prior written agreement from the

sponsor or its designee must be obtained for the disclosure of any said confidential information to other parties.

#### 12.2.7 Data Protection

All Investigators and study site staff involved with this study must comply with the requirements of the appropriate data protection legislation (including the General Data Protection Regulation and Data Protection Act) with regard to the collection, storage, processing and disclosure of personal information.

Computers used to collate the data will have limited access measures via user names and passwords.

Published results will not contain any personal data and be of a form where individuals are not identified and re-identification is not likely to take place

### 13 STUDY CONDUCT RESPONSIBILITIES

#### 13.1 PROTOCOL AMENDMENTS

Any changes in research activity, except those necessary to remove an apparent, immediate hazard to the participant in the case of an urgent safety measure, must be reviewed and approved by the Chief Investigator.

Amendments will be submitted to a sponsor representative for review and authorisation before being submitted in writing to the appropriate REC, and local R&D for approval prior to participants being enrolled into an amended protocol.

#### 13.2 MANAGEMENT OF PROTOCOL NON COMPLIANCE

Prospective protocol deviations, i.e. protocol waivers, will not be approved by the sponsors and therefore will not be implemented, except where necessary to eliminate an immediate hazard to study participants. If this necessitates a subsequent protocol amendment, this should be submitted to the REC, and local R&D for review and approval if appropriate.

Protocol deviations will be recorded in a protocol deviation log and logs will be submitted to the sponsors every 3 months. Each protocol violation will be reported to the sponsor within 3 days of becoming aware of the violation. All protocol deviation logs and violation forms should be emailed to QA@accord.scot

Deviations and violations are non-compliance events discovered after the event has occurred. Deviation logs will be maintained for each site in multi-centre studies. An alternative frequency of deviation log submission to the sponsors may be agreed in writing with the sponsors.

#### 13.3 SERIOUS BREACH REQUIREMENTS

A serious breach is a breach which is likely to effect to a significant degree:

- (a) the safety or physical or mental integrity of the participants of the trial; or
- (b) the scientific value of the trial.

If a potential serious breach is identified by the Chief investigator, Principal Investigator or delegates, the co-sponsors (seriousbreach@accord.scot) must be

notified within 24 hours. It is the responsibility of the co-sponsors to assess the impact of the breach on the scientific value of the trial, to determine whether the incident constitutes a serious breach and report to research ethics committees as necessary.

#### 13.4 STUDY RECORD RETENTION

All study documentation will be kept for a minimum of 3 years from the protocol defined end of study point. When the minimum retention period has elapsed, study documentation will not be destroyed without permission from the sponsor.

#### 13.5 END OF STUDY

The end of study is defined as the deactivation of the online study.

The Investigators or the co-sponsor(s) have the right at any time to terminate the study for clinical or administrative reasons.

The end of the study will be reported to the REC, and R+D Office(s) and co-sponsors within 90 days, or 15 days if the study is terminated prematurely. The Investigators will inform participants of the premature study closure and ensure that the appropriate follow up is arranged for all participants involved. End of study notification will be reported to the co-sponsors via email to [resgov@accord.scot](mailto:resgov@accord.scot).

A summary report of the study will be provided to the REC within 1 year of the end of the study.

#### 13.6 INSURANCE AND INDEMNITY

The co-sponsors are responsible for ensuring proper provision has been made for insurance or indemnity to cover their liability and the liability of the Chief Investigator and staff.

The following arrangements are in place to fulfil the co-sponsors' responsibilities:

- The Protocol has been designed by the Chief Investigator and researchers employed by the University and collaborators. The University has insurance in place (which includes no-fault compensation) for negligent harm caused by poor protocol design by the Chief Investigator and researchers employed by the University.
- Sites participating in the study will be liable for clinical negligence and other negligent harm to individuals taking part in the study and covered by the duty of care owed to them by the sites concerned. The co-sponsors require individual sites participating in the study to arrange for their own insurance or indemnity in respect of these liabilities.
- Sites which are part of the United Kingdom's National Health Service will have the benefit of NHS Indemnity.

- Sites out with the United Kingdom will be responsible for arranging their own indemnity or insurance for their participation in the study, as well as for compliance with local law applicable to their participation in the study.

## 14 REPORTING, PUBLICATIONS AND NOTIFICATION OF RESULTS

### 14.1 AUTHORSHIP POLICY

Ownership of the data arising from this study resides with the study team .

Patient Participant Information Sheet

You are invited to take part in the following research project:

***Exploring Close Relationships in Patient-Caregiver Populations experiencing Persistent Pain***

Before you decide to take part, it is important you understand why the research is being conducted and what it will involve.

You should please take time to read the following information carefully.

What is the study about?

The aim of this study is to explore the influence of close relationships on the 'chronic pain' experience. It is hoped that by understanding these complex and interpersonal factors, we can optimise services by tailoring pain management programmes and interventions to the needs of the patient. Ultimately, this research is intended to improve future patient care. Please remember, this is a study exploring close relationships, so where applicable, your partner or caregiver is expected to complete the second half of this online study. Parts I and II are to be completed one after the other, so please ensure your partner/caregiver is ready to participate after you complete Part I.

Why have I been asked to take part?

You have been asked to take part as you are an adult patient with persistent pain. Pain is described as 'chronic' or 'persistent' when it has persisted or recurred for three months or longer.

Am I eligible to take part?

To participate you should;

be over the age of 18 (no upper age limit)

have a diagnosis of chronic pain.

consider yourself fluent in English

not be diagnosed with cancer-related pain, as some of the questionnaire items are not compatible with this patient group

not experiencing acute pain, or rather pain of recent onset i.e. pain lasting less than three months.

Do I have to take part?

It is up to you to decide whether or not to take part. If you do decide to participate, you will be asked to sign the consent form on the next page (through a tick box mechanism).

If you decide to take part, you are still free to discontinue the study at any time and without giving a reason. You can do this by closing the webpage. However, you will be unable to withdraw once your answers are submitted.

Deciding not to take part or withdrawing from the study will not affect the healthcare you or your partner will receive.

### What will it involve?

Taking part in this study will involve you (and your partner/caregiver, where applicable) participating in an online questionnaire, lasting approximately 15 minutes. You can complete the questionnaire on any device/browser and take as much time as you need.

#### Part I. For Individuals with Persistent Pain

Once you have finished reading this information sheet, if you wish to take part you will be able to give your consent and begin. We will ask you some questions about your experiences of having chronic pain, specifically in relation to your mood, activity, motivation and some general questions about how you form relationships.

**Individuals without partners/caregivers need only complete Part I of the questionnaire.**

You will then be asked to read some information on the Debriefing page., which will provide further information on the study.

If you have a partner/caregiver and they have agreed to participate, they will also be asked to read an information sheet, indicate their consent and complete Part II of the questionnaire. This part of the questionnaire will last approximately 5 minutes, and asks similar questions to Part I. **You should complete your sections independently**

#### Will my taking part in the study be kept confidential?

No identifiable information will be requested or collected in the course of the online questionnaire. After it is completed, your answers will be electronically inputted into a secure NHS Grampian database, stored securely until statistical analysis is undertaken. This anonymous data is only accessible by members of the research team.

#### What are the possible benefits of taking part?

You will be participating in research intended to improve future patient care for individuals with persistent pain.

There is also an opportunity to participate in a prize draw for a £50 Amazon Voucher (one entry per couple). Following completion of the questionnaire, a hyperlink will be made available to take you to a separate webpage. These contact details will be stored securely on a separate NHS database, and will not be linked in any way to the questionnaire data. Only the lead researcher will be able to access this information, and once the prize has been awarded, any information within this database will be permanently deleted.

#### What are the possible disadvantages and risk of taking part?

There are no known risks to taking part in this research, however, this may be an emotive topic and may bring up issues that are sensitive to you. You will also be given an online debrief information at the end of the research with access to further information. The study will also require you to volunteer your time (approximately 20- 25 minutes total).

#### What if I want to withdraw from the study?

Agreeing to participate in this project does not oblige you to complete the questionnaire, participate in the prize draw or have any further obligation to this study. You should note that any data from discontinued questionnaires may be used in the production of formal research outputs (e.g. journal articles, conference papers, theses and reports).

#### What will happen with the collected information/data?

This information will be used to establish to ascertain the influence of relationships on the chronic pain experience. The analysis of the research will be written up and discussed in relation to previous research in this area. I will not include any personally identifiable information within the write up of the research. The results of this study may be summarised in published articles, reports and presentations. If you would like a copy of the results, please follow the links to the Wiki on the debriefing page.

All data collected during this research will be stored securely and in line with data protection guidelines. These may be used for future ethically approved research. ***When you agree to take part in a research study, the information you provided to researchers may be provided to researchers running other research studies in this organisation and other organisations. These organisations may be universities, NHS organisations or companies involved in health and social care research. The information you provide will only be used to conduct research in accordance with the UK Policy Framework for Health and Social Care Research. This information will not identify you and will not be combined with other information in a way that could identify you. The information will only be used for the purpose of health and social care research and cannot be used to contact you or affect your employment.*** You can find more about how we use your information and our legal basis for doing so in our Privacy Notice at

[https://foi.nhsgrampian.org/globalassets/foidocument/foi-public-documents1---all-documents/nhs\\_grampian\\_data\\_protection\\_notice.pdf](https://foi.nhsgrampian.org/globalassets/foidocument/foi-public-documents1---all-documents/nhs_grampian_data_protection_notice.pdf)

#### Who is organising the research and why?

The research is being conducted by a Trainee Clinical Psychologist, Katherine Berlouis, who is completing their Doctorate level training in Clinical Psychology at the University of Edinburgh in conjunction with NHS Grampian. This research is being conducted as part of a thesis project which is an essential component of this training.

The University of Edinburgh is the sponsor for this study based in Scotland. We will be using information from you in order to undertake this study and will act as the data controller for this study. This means that we are responsible for looking after the information you provide and using it properly.

Your rights to access, change or move the information you provide are limited, as we need to manage the data and information provide in specific ways in order for the research to be reliable and accurate. To safeguard your rights, any information collected from the online questionnaire is fully anonymised, as no identifiable information will be requested. Email addresses provided for the prize draw will be safeguarded on a separate secure NHS database and will be removed immediately following the selection of the winner.

You can find out more about how we use your information

<https://www.ed.ac.uk/records-management/data-protection> or by contacting the data protection officer on the details below.

#### Who has reviewed the study?



The study proposal has been reviewed by Dr David Gillanders (Research Supervisor). All research in the NHS is looked at by an independent group of people called a Research Ethics Committee. This study has been given a favourable opinion by xx REC. NHS Grampian management approval has also been obtained.

If you would like to discuss this research with someone independent of the study team, please contact:

Dr Angus Macbeth  
Deputy Director of Research (School of Health in Social Science)  
Department of Clinical and Health Psychology  
School of Health in Social Science  
University of Edinburgh  
Teviot Place  
EH8 9AG  
Tel no: +44 (0)131 650 3893

If you wish to make a complaint about the study, please contact NHS Grampian:

NHS Grampian Feedback Service  
Summerfield House  
2 Eday Road  
Aberdeen  
AB15 6RE

Tel: 0345 337 6338; E-

mail [nhsgrampian.feedback@nhs.net](mailto:nhsgrampian.feedback@nhs.net)

If you wish to raise a complaint on how we have handled your personal data, you can contact our Data Protection Officer who will investigate the matter. If you are not satisfied with our response or believe we are processing your personal data in a way that is not lawful you can complain to the Information Commissioner's Office (ICO) at

<https://ico.org.uk/>

Data Protection Officer contact information:

University of Edinburgh  
Data Protection Officer  
Governance and Strategic Planning  
University of Edinburgh  
Old College  
Edinburgh  
EH8 9YL  
Tel: 0131 651 4114; Email: [dpo@ed.ac.uk](mailto:dpo@ed.ac.uk)

**More information about the study and study updates can be found at EACPWiki**

## Appendix F

### **Marital status**

Independent samples t-tests were conducted to explore whether there were differences in terms of distress or quality of life for those who reported they were in a dyad and those who completed the questionnaire as a single individual.

Those who reported they were in a close relationship with a partner or caregiver, reported slightly higher depressive symptoms ( $M = 12.33$ ,  $SD = 4.26$ ) than those not in a close relationship ( $M = 11.50$ ,  $SD = 4.58$ ). This difference was not significant  $t(148) = -1.08$ ,  $p = .279$ .

In terms of anxiety, participants in a close relationship with a partner or caregiver reported better quality of life ( $M = 82.68$ ,  $SD = 15.876$ ) than those not in a relationship ( $M = 79.50$ ,  $SD = 18.618$ ). This difference was not significant  $t(101) = -.813$ ,  $p = .418$ . These results were consistent with previous research.